



Aerospace Medicine  
and Biology  
A Continuing  
Bibliography  
with Indexes

NASA SP-7011 (188)  
January 1979

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IAA (A-10000 Series)      A78-50239—A78-53918

# AEROSPACE MEDICINE AND BIOLOGY

## A CONTINUING BIBLIOGRAPHY WITH INDEXES

### (Supplement 188)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in December 1978 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA)*



Scientific and Technical Information Branch

1979

**National Aeronautics and Space Administration**

Washington, DC

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# INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 230 reports, articles and other documents announced during December 1978 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964, since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1978 Supplements.

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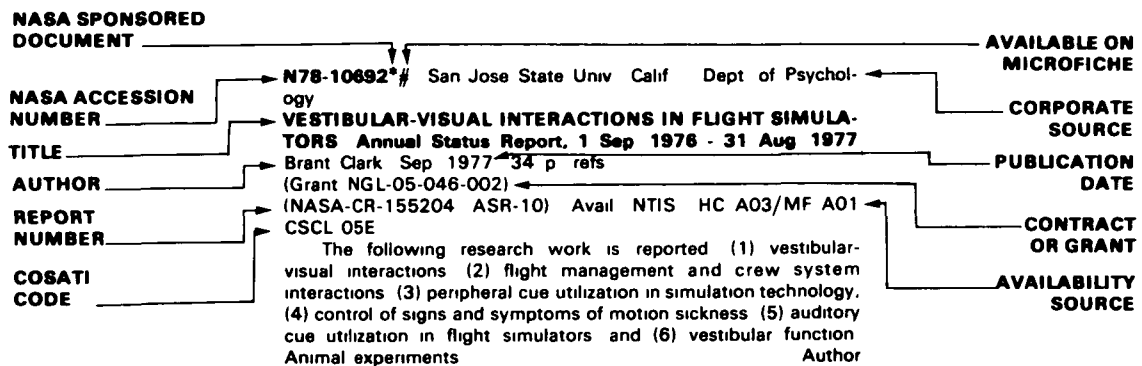
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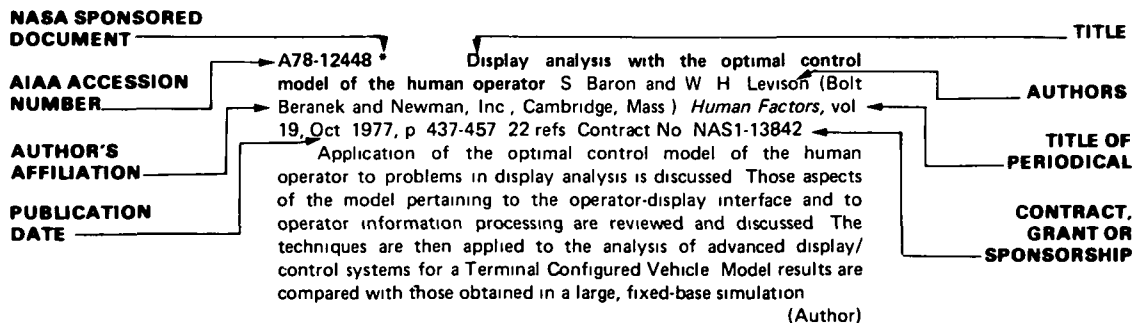
# TABLE OF CONTENTS

	Page
IAA Entries (A78-10000) .....	289
STAR Entries (N78-10000) .....	305
Subject Index .....	I-1
Personal Author Index .....	I-25

## TYPICAL CITATION AND ABSTRACT FROM *STAR*



## TYPICAL CITATION AND ABSTRACT FROM *IAA*





# AEROSPACE MEDICINE AND BIOLOGY

*A Continuing Bibliography (Suppl. 188)*

JANUARY 1979

## IAA ENTRIES

**A78-50267** Human-factors optimization of displays and control units for pilot and copilot (Anthropotechnisch optimierte Anzeige- und Bediensysteme für Pilot und Lotse) R Beyer (Deutsche Forschungs- und Versuchsanstalt für Luft und Raumfahrt, Institut für Flugführung, Braunschweig, West Germany) *DFVLR-Nachrichten*, Aug 1978, p 23-27 In German

In a man machine approach, consideration is given to relationships among display sophistication, control sophistication, pilot workload, and equipment cost. Problems of human factor engineering as they relate to pilot performance are discussed, and consideration is given to the human-factors design of display and control unit combinations. A functional model of a central display-and control system for pilot and copilot is discussed. B J

**A78-50277** Formation of early earth regolith M D Nussinov and A A Vekhov (Akademiia Nauk SSSR, Institut Kosmicheskikh Issledovaniy, Moscow, USSR) *Nature*, vol 275, Sept 7, 1978, p 19-21 21 refs

It is suggested that the regolith grains which formed on the early earth's surface during an epoch of a strongly rarefied atmosphere could provide an appropriate environment for the origin of life. The regolith in a planet with rarefied atmosphere is contrasted with the regolith in an airfree planet with regard to the effects of radiation and meteorite impacts. The earth's early regolith particles are considered to be a more favorable site for the evolution of complex chemical compounds than is interstellar dust because of the density of ambient gas around the particles, a higher concentration of particles, a relatively higher temperature, and the presence of water. The possibility of simulating the early regolith in laboratory studies is suggested. M L

**A78-50531** # Effect of age on mechanical properties and biochemical composition of the heart arteries in man (Vliyanie vozrasta na mekhanicheskie svoystva i biokhimicheskiy sostav arteriy serdtsa cheloveka) B O Ozola, B A Purinia, and L I Slutskii (Akademiia Nauk Latvisskoi SSR, Institut Mekhaniki, Polimerov, Rizhskii Nauchno Issledovatel'skii Institut Travmatologii i Ortopedii, Riga, Latvian SSR) *Mekhanika Polimerov*, May-June 1978, p 502-506 15 refs In Russian

The principal mechanical properties of the walls of the heart arteries in subjects in two age groups were determined. The subjects were also divided into persons with no visible arteriosclerosis and those with considerable arteriosclerosis of the vascular wall. Also, the quantitative content of seven basic biochemical components of the walls of the right and left heart arteries were determined in four age groups. In both mechanical properties and quantitative content of basic biochemical components of the walls, the sharpest changes were noted in persons over 40 years of age. P T H

**A78-50651** Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers Conference sponsored by the American Institute of Aeronautics and Astronautics New York, American Institute of Aeronautics and Astronautics, Inc., 1978 182 p Members, \$17, nonmembers, \$22

Aspects of the development and validation of drive concepts for an advanced G-cuing system are considered along with the platform motion for fighter simulations, depth perception and motion cues via textured scenes, a new technique in image generation, advanced tactical air combat simulation, correlated data bases for the present and future, and an application of aircraft motion simulation techniques to land borne vehicles. Attention is given to accurately reproducing pilot's control forces in a flight simulator, computer implemented grading of flight simulator students, electronic warfare simulation for Air Force weapon system trainers, a unique approach to aerial refueling simulation for training boom operators, closed loop models for analyzing the effects of simulator characteristics, planning and conducting subjective evaluations of flight simulators, a test instrumentation system for flight simulator handling characteristics, and time delays in flight simulators. G R

**A78-50652** # Development and validation of drive concepts for an advanced G-cuing system W B Albery and R T Gill (USAF, Human Resources Laboratory, Wright Patterson AFB, Ohio) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 1-3 (AIAA 78 1571)

Multicelled, pneumatic systems were originally developed as acceleration sustaining devices with the concept that a motion platform could provide the simulated onset acceleration and that once the platform's initial cue was 'washed out' that a G-seat could provide the effect of sustaining that acceleration cue. It was found, however, that first generation G-cuing hardware were not compatible with the high performance aircraft simulation required for the A-10, F-15, and F-16. In 1976, a contract was, therefore, awarded for the development of the Advanced Low Cost G-Cuing System (ALCOGS). ALCOGS is to be employed in an engineering research environment to further develop seat G-cuing hardware and drive concept technology and to develop specifications for tactical aircraft simulators, especially the F-16. G R

**A78-50653** # Development of the Advanced G Cuing System G J Kron and J M Kleinwaks (Singer Co., Link Div., Binghamton, N.Y.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 4-14 Contract No F33615-76-C-0060 (AIAA 78 1572)

G seats presently implemented on operational flight simulators lack the response speed necessary for research in areas of transient cuing and determination of necessary response characteristics for optimal acceleration cuing for tactical flight simulation. The Advanced G-Cuing System is a highly flexible research system with the aforementioned capabilities, along with the capability to accommodate the F-16 tilt back seat configuration and to provide closed

loop servo operation. Hydraulic actuators, providing cushion surface elevation and orientation changes, and pneumatic firmness bladders, providing flesh pressure and area of contact variations, combine to form a hybrid system. The system demonstrates fast response, meeting a 30 msec rise time specification. (Author)

**A78-50654 \* # The effect of helmet loader G-cueing on pilot's simulator performance** B R Ashworth and B T McKissick (NASA, Langley Research Center, Hampton, Va.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 15-20 (AIAA 78-1573)

A helmet loader has been designed and tested in a differential maneuvering simulator which provides the proper cues without restricting the pilot's movement or requiring cumbersome attachments. An experiment was conducted to determine the effect of the loader on both test pilots and operational F 15 pilots. Both the objective and subjective data from the experiment were used to determine the effect of the helmet provided acceleration cues on the simulator pilot's performance. An analysis of the obtained data indicates that the helmet-loader does have measurable effect on the pilot/simulator system. The effect is mainly seen in the transition portion of the task. The pilots significantly increase their control outputs for pitch which causes a significant increase in aircraft pitch rate. G R

**A78-50655 \* # Platform motion for fighter simulations** R V Parrish (NASA, Langley Research Center, Hampton, Va.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 21-31. 21 refs (AIAA 78-1574)

The reported investigation is concerned with aspects of 'realistic' cue generation and evaluation. 'Realistic' cues are defined to mean cues that are representative of an aircraft, that are of sufficient magnitude to be sensed, that are in the proper direction arriving at the proper time, and yet that are within the presentation capabilities of the washout/synergistic platform system. Attention is given to the aircraft mathematical model, computer implementation, cockpit hardware, visual display, the motion system, vertical acceleration, longitudinal acceleration and pitch rate, and lateral acceleration and roll rate. The motion cues for fighter aircraft produced by Langley nonlinear adaptive washout/synergistic motion base system are found to be unacceptable in the roll axis representation. However, a method for producing potentially realistic roll cues is identified. G R

**A78-50656 # Optimal control theory applied to the design of cue shaping filters for motion-base simulators** R L Kosut (Singer Co., Link Div., Binghamton, N Y.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 32-37. 8 refs (AIAA 78-1575)

The considered investigation is mainly concerned with a formulation of the fundamental problem of designing cue-shaping filters for a motion-base simulator, taking into account an approach which makes it possible to utilize optimal control theory to develop a nonlinear cue-shaping filter. The relative merits of linear and nonlinear cue-shaping filters are compared. Attention is given to aspects of notation, the definition of cue-errors, platform dynamics, linear optimal tracking control, and nonlinear optimal tracking control. The preliminary evaluation of the nonlinear optimal control considered indicates improvement over linear cue-shaping in regard to utilizing more of the available platform performance envelope. G R

**A78-50657 # Motion - Methods and requirements** W T Harris, J A Puig, G L Ricard, and D G Weinman (U S Navy, Naval Training Equipment Center, Orlando, Fla.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20,

1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 38-45. 6 refs (AIAA 78-1576)

Primary objectives of the described research program are related to an assessment of the training effectiveness of several of the flight simulator cockpit motion drive algorithms in current use today and the selection of those which are most training effective. The selected algorithms are to be developed for specific Navy tasks and to be related to motion system characteristics. An engineering analysis is conducted, taking into account the hardware performance capabilities of the equipment used in the experiments, an evaluation of the fidelity of the simulation of the reference aircraft flying qualities and performance, and an evaluation of the drive algorithms in use in the cockpit motion research. G R

**A78-50658 # Depth perception and motion cues via textured scenes** R V Reynolds, W O Dungan, Jr., and G J Suttly (Technology Service Corp., Santa Monica, Calif.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 46-48. 5 refs. Contract No F33615-C-0063 (AIAA 78-1577)

A lack of depth perception cues makes it difficult for pilots who try to land on homogeneous surfaces to judge the height above the surface. Flight simulators that generate untextured surfaces must utilize nontextural cues for generating depth perception. Today's state-of-the-art flight simulators generate real time untextured scenes. An investigation is conducted regarding the occurrence of an unexpected phenomenon in connection with the viewing of video imagery. When textured scenes were viewed in real time, 30 frames per second, temporal aliasing appeared in the form of scintillating bands. Depth perception cues are examined, taking into account primary cues, traditional secondary cues, and motion cues which yield information on depth perception. A description is presented of depth perception experiments, and texture gradients are considered. G R

**A78-50663 # Accurately reproducing pilot's control forces in a flight simulator** B W McFadden and J G Joas (McFadden Electronics Co., South Gate, Calif.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 90-98 (AIAA 78-1585)

An investigation is conducted regarding the various requirements which have to be satisfied for an accurate reproduction of the pilot's control forces in a flight simulator. It is found that a high performance control force loading system is an essential part of a cost effective, safe and energy efficient flight simulator. Lack of fidelity can ruin the training effectiveness of an otherwise excellent trainer, or result in invalid conclusions in a research simulator. The problems associated with poor control loading fidelity are lack of bandpass in generating various control force functions, incapability of generating functions requiring light stick forces, and a lack of anticipation of independent adjustment of enough functions to accommodate real flight test data, available frequently only after the simulator is built. G R

**A78-50664 # Verification of workload - A job for simulation** T C Way (Boeing Aerospace Co., Seattle, Wash.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 99-104. 12 refs (AIAA 78-1586)

The challenge to designers of flight decks and avionics suites, is to configure the crew station in such a way that required tasks can be accomplished by the allotted crew complement while holding crew workload within reasonable limits. An outline is presented of an approach involving the use of piloted simulation as an aid in meeting this challenge. The advantages of simulation over flight test for workload studies include cost, safety, efficiency, and timeliness. It is found that the state-of-the-art in fine-grain workload assessment is

not particularly satisfying. However, it is possible to take the broader approach of designing and integrating a flight deck to minimize workload based on prior experience, industry standards, and good human engineering practice. G R

**A78-50665 # Computer implemented grading of flight simulator students** F L Comstock (Singer Co., Link Div., Binghamton, N Y) and H J J Uyttenhove (New York, State University, Binghamton, N Y) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 105-113. 10 refs (AIAA 78-1589)

An investigation into computer monitoring of aircrew performance and subsequent evaluation of that performance. The study presumes that it is possible to develop, for each training task, a General System model of aircrew skill development within the mathematical framework of set theory. Through the judicious selection of parameters to be monitored, and by utilization of a reasonable amount of computer resources, an evaluation can be made by comparing student performance to a performance optimum. The technique involves the development of a State Transition Structure difference matrix from the matrix representing the students performance and the matrix representing the optimum performance. (Author)

**A78-50666 # A unique approach to aerial refueling simulation for training boom operators** J LaRussa (Farrand Optical Co., Inc., Valhalla, N Y), F G Albers (Dayton, University, Dayton, Ohio), S J Rosengarten, A J Schneider, and R J Heintzman (USAF, Aeronautical Systems Div., Wright Patterson AFB, Ohio) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 124-137. (AIAA 78-1591)

The goal to reduce fuel consumption for flight training led to plans for an increased utilization of flight simulators. In this connection requirements were documented for aerial refueling part task trainers to train B-52 pilots and aerial refueling trainers to train KC 135 boom operators. Strategic Air Command (SAC) expressed the need for a KC 135 Boom Operator Part Task Trainer. Approval for in-house development was granted in August of 1975. The considered program was from all aspects a highly successful development effort. It not only provided SAC with a valuable training tool, but demonstrated the feasibility of a number of new technological developments. G R

**A78-50667 \* # Closed loop models for analyzing the effects of simulator characteristics** S Baron, R Muralidharan, and D Kleinman (Bolt Beranek and Newman, Inc., Cambridge, Mass.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 138-148. 11 refs. Contract No. NAS1-14449 (AIAA 78-1592)

The optimal control model (OCM) of the human operator is used to develop closed-loop models for analyzing the effects of (digital) simulator characteristics on predicted performance and/or workload. Two approaches are considered: the first utilizes a continuous approximation to the discrete simulation in conjunction with the standard optimal control model; the second involves a more exact discrete description of the simulator in a closed-loop multi-rate simulation in which the optimal control model 'simulates' the pilot. Both models predict that simulator characteristics can have significant effects on performance and workload. (Author)

**A78-50668 # A model for the pilot's use of motion cues in steady-state roll-axis tracking tasks** W H Levison (Bolt Beranek and Newman, Inc., Cambridge, Mass.) and A M Junker (USAF, Aerospace Medical Research Laboratory, Wright Patterson AFB, Ohio) In Flight Simulation Technologies Conference, Arlington,

Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 149-159. 24 refs. Contract No. F44620-75-C-0060 (AIAA 78-1593)

An experimental and analytical study was performed to develop and test a model for the pilot's use of roll-axis motion cues. Principal experimental variables were the presence or absence of simulator motion, the nature of the external disturbance, simulated vehicle dynamics, and the nature of the motion cues provided during moving-base simulation. The effects of motion cues on closed-loop system performance and pilot response behavior were qualitatively and quantitatively dependent on the details of the tracking task. The optimal control model for pilot/vehicle analysis provided a relatively task independent framework for accounting for the pilot's use of motion cues. The availability of motion cues was modeled by augmenting the set of assumed perceptual variables to include the position, velocity, acceleration, and acceleration rate of the roll-axis simulator with the exception that position information was omitted when the roll tilt cue was absent. Results were consistent with the hypothesis of attention-sharing between visual and motion variables. (Author)

**A78-50670 # Time delays in flight simulators - Behavioral and engineering analyses** G L Ricard and W T Harris (US Navy, Naval Training Equipment Center, Orlando, Fla.) In Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers. New York, American Institute of Aeronautics and Astronautics, Inc., 1978, p 169-175. 13 refs (AIAA 78-1596)

An investigation is conducted of data which have been obtained by Ricard et al (1976) who have studied suitable forms of a compensation for flight simulation system delays. In their experiment, Ricard et al had subjects use a two-axis, side-arm controller to provide inputs for a simulated artificial horizon display. Four subjects were asked to control the system for two-minute trials with inserted delays of 200, 400, and 800 milliseconds and break points for the low-pass filters of 1/2, 1, 2, 3, 4, 5, 6, 7, and 8 radians/second. On the basis of an evaluation of the obtained data suggestions are made concerning the type of compensation that may aid the manual control of systems containing delays. G R

**A78-50750 # A procedure for the automated analysis of vestibular nystagmus (Metodika avtomaticheskogo analiza vestibulyarnogo nistagma)** E V Lapaev, S N Zagorodnikov, O A Vorob'ev, and I I Pererva. *Fiziologiya Cheloveka*, vol 4, July-Aug 1978, p 751-755. 11 refs. In Russian.

The described procedure permits automated analysis of vestibular nystagmus with regard to the basic indexes and without any preliminary 'manual' treatment of the electronystagmogram. Examples of the time-dependent simultaneous plots of amplitude, duration, and speed of either the fast or slow phase are presented. The testing of the procedure is explained. M L

**A78-50997 # The mechanisms of development of morphological changes in mammals on biosatellites (O mekhanizmkh razvitiia morfologicheskikh izmenenii u mlekopitaushchikh, nakhodivshikhsia na biologicheskikh sputnikakh)** V V Portugalov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Akademiia Nauk SSSR, Izvestiia, Seriya Biologicheskaiia*, July-Aug 1978, p 501-506. 25 refs. In Russian.

Morphological changes in rats after 19 5-22 5 days of space flight are discussed. All reported changes disappeared or diminished significantly by one month postflight. Bone changes (osteoporosis of spongy segments of long bones), atrophy of skeletal muscles, and inhibition of bone-marrow erythropoiesis were the most prominent effects of space flight, but changes in lymph organs, the hypothalamic hypophyseal neurosecretory system, the vestibular system, and the retinas are considered. M L



**A78-50998 #** Present status of the problem concerning the detection of gravity by plants (Sovremennoe sostoianie voprosa o mekhanizme gravitoretseptsiu u rastenii) M G Taibekov and G P Parfenov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Akademiia Nauk SSSR, Izvestiia, Seria Biologicheskaiia*, July-Aug 1978, p 535-544 44 refs In Russian

Recent experimental and theoretical studies of geotropism in plants are reviewed. The molecular mechanisms of detection and response to gravity are considered. It is suggested that the mechanism at the cell level involves interaction between cell organelles and the endoplasmic reticulum membrane. M L

**A78-51078** Retinal tissue damage induced by single ultra-short 1060 nm laser light pulses J Taboada and W D Gibbons (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) *Applied Optics*, vol 17, Sept 15, 1978, p 2871, 2872 11 refs

Ocular tissue damage induced by laser light with 5.9 psec pulses is discussed. Results are presented for the pulse energy necessary to induce an ophthalmoscopically observable retinal lesion in the rhesus monkey. The data are applicable to determining ocular safety standards for ultrashort laser pulses and for studying nonthermal channels of cellular injury. The present work and that of Ham et al (1974) suggest that threshold damage processes may be functions of power density. S C S

**A78-51137 \*** Photocatalytic oxidation of organic compounds on Mars S F S Chun, K D Pang, J A Cutts (Planetary Science Institute, Pasadena, Calif.), and J M Ajello (California Institute of Technology, Jet Propulsion Laboratory, Pasadena, Calif.) *Nature*, vol 274, Aug 31, 1978, p 875, 876 17 refs. Contracts No JPL-954149, No NAS111851

Ultraviolet-stimulated catalytic oxidation is proposed as a mechanism for the destruction of organic compounds on Mars. The process involves the presence of gaseous oxygen, UV radiation, and a catalyst (titanium dioxide), and all three of these have been found to be present in the Martian environment. Therefore it seems plausible that UV-stimulated oxidation of organics is responsible for degrading organic molecules into inorganic end products. P T H

**A78-51222** Heat transfer principles in personal protection applications A M Stoll, M A Chianta, and J R Piergallini (U.S. Naval Material Command Naval Air Development Center, Warminster, Pa.) *SAFE Journal*, vol 8, Fall, 1978, p 16-19 8 refs

Thermally 'safe' materials, thermal penetration of the cockpit canopy, and rocket plume flames encountered in multiple-seat ejections are discussed with reference to biophysical heat transfer principles and the nature of the physiological effect. Events associated with burn injury and pain sensation are surveyed, and heat transfer by conduction, radiation, and convection are separately examined. The type of pertinent data obtained by experiments currently underway is considered, and aspects requiring more data are indicated. M L

**A78-51225 \*** Inhibition of bone formation during space flight E R Morey (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.) and D J Baylink (U.S. Veterans Administration Hospital, Tacoma, Washington, University, Seattle, Wash.) *Science*, vol 201, Sept 22, 1978, p 1138-1141 20 refs. Grant No NIH-DE-02600 NASA Order RA 18698 B

Parameters of bone formation and resorption were measured in rats orbited for 19.5 days aboard the Soviet Cosmos 782 biological satellite. The most striking effects were on bone formation. During flight, rats formed significantly less periosteal bone than did control rats on the ground. An arrest line at both the periosteum and the endosteum of flight animals suggests that a complete cessation of bone growth occurred. During a 26-day postflight period, the defect in bone formation was corrected. No significant changes in bone resorption were observed. (Author)

**A78-51299** Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming E Barta, P Brvenik, J Kolesar, and F Babusikova (Research Institute of Human Bioclimatology, Bratislava, Czechoslovakia) *European Journal of Applied Physiology*, vol 39, no 3, 1978, p 173-179 25 refs

**A78-51300** Lipid metabolism during exercise I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness V Vihko, J Soimajarvi, E Karvinen, P Rakkila, and M Havu (Jyväskylä, University, Jyväskylä, Finland) *European Journal of Applied Physiology*, vol 39, no 3, 1978, p 209-218 28 refs. Research supported by the Ministry of Education of Finland

**A78-51318 #** The consolidation process and some of its neurochemical mechanisms (Protess konsolidatsii i nekotorye ego nerokhimicheskie mekhanizmy) R I Kruglikov (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) *Uspekhi Fiziologicheskikh Nauk*, vol 9, July-Sept 1978, p 3-27 200 refs In Russian

A review is presented of the literature on consolidated memory traces or engrams. The dominant role of neuromediator processes and changes in the metabolism of nucleic acids and proteins in the consolidation process is emphasized; these two effects are said to represent stages of a unified process during which the information that has been received by the brain is transferred from the long term memory to the short term memory and is consolidated in the latter. The roles of catecholamines in the development of memory traces and that of serotonin in their consolidation are discussed. B J

**A78-51319 #** Interrelationship of the properties of visual neurons (Vzaimosviaz' svoistv zritel'nykh neuronov) I A Shevelev (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neurofiziologii, Moscow, USSR) *Uspekhi Fiziologicheskikh Nauk*, vol 9, July-Sept 1978, p 28-48 115 refs In Russian

The paper presents a review of the published literature on the interrelationship of the quantitative characteristics which define the activity of visual neurons. It is proposed that there are simple general factors which determine the entire set of functional characteristics of neurons and their role in the processing and analysis of visual signals. The dominant role is said to be that of properties of stimulatory afferent connections of nerve cells; these properties determine the functional characteristics of neurons either directly or through the properties of the horizontal inhibition system. B J

**A78-51320 #** Quantitative systems analysis of various regimes of intense muscular loading (Kolichestvennyi sistemnyi analiz razlichnykh rezhimov intensivnoi myshechnoi nagruzki) A N Vazin, A P Sorokin, and K V Sudakov (Meditsinskii Institut, Gorki, Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR) *Uspekhi Fiziologicheskikh Nauk*, vol 9, July-Sept 1978, p 133-148 52 refs In Russian

It is shown that the response of the human organism to intense muscular loading (e.g., running on a treadmill at a speed of 15 km/h) proceed through a number of stages. A quantitative analysis of changes in the respiratory and cardiovascular indices has made it possible to identify six successive stages of such response, each of which is characterized by the formation of functional systems of different complexity and efficiency. This scheme of successive stages of response is used to investigate work capacity in relation to intense muscular loading. B J

**A78-51347** Unimanual and bimanual control in a compensatory tracking task H S R Kao (University of Hong Kong, Hong Kong) and K U Smith *Ergonomics*, vol 21, Sept 1978, p 661-669 13 refs

An experiment comparing the unimanual and bimanual control performance of human operators in a compensatory tracking task is described with reference to two variables of the control system.

dynamics, the target wave frequencies and the delayed visual feedback (DVF) of operator's hand control motion. Target wave frequencies of 0.067, 0.167, and 0.383 Hz, and DVF of 0, 0.2, 0.4, 0.8, and 1.5 s were used. The results indicate that unimanual tracking was significantly superior to the bimanual tracking under DVF conditions and higher levels of wave frequency, but was not superior for zero DVF or low wave frequencies. Tracking performance degraded as wave frequencies or DVF increased, and motor learning occurred during three wave frequencies without, but not with, DVF.

M L

**A78-51348** Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres. M W Hurst and R M Rose (Boston University, Boston, Mass.) *Ergonomics*, vol 21, Sept 1978, p 697-708. 16 refs. FAA supported research.

Two thousand observations on 47 radar sectors in Boston and New York were used to determine the principal behavioral stressors in the air traffic control environment. Predictor variables included peak traffic, mean airspeed, sector area, sector type, radio-communication time, and theoretically derived control load factors. Expert observers rated the degree of activity and behavioral arousal of ATCs working the 47 radar sectors at the same time the objective measures were made. These 'pace' ratings were significantly related to peak traffic count and duration of radio-communications. The control load factors were not related to behavioral responses. Statistical analyses indicated several refinements for the definition and measurement of the control load factors. For example, airspace control load was reliably estimated by sector type and number of transitioning planes, while coordination control load was most appropriately estimated by duration of radio-communications. These results suggested that estimations of workload may be made by a relatively few objective measures, and that at least one estimate of individual's behavioral responses, i.e., pace ratings, can be predicted by peak traffic counts. (Author)

**A78-51386** # Small oscillations of an ideal fluid with consideration of mass forces in the elastic shell (Mal'ye kolebaniia idealnoi zhidkosti s uchetom massovykh sil v uprugoi obolochke). R Iu. Amenzade (Azerbaidzhanskii Gosudarstvennyi Universitet, Baku, Azerbaidzhan SSR) *Akademiia Nauk SSSR, Doklady*, vol 241, July 1, 1978, p 44-47. 6 refs. In Russian.

Consideration is given to the response of a deformable elastic shell to an ideal incompressible fluid which is flowing inside it. The flow is considered to be laminar and axisymmetric and the equations of motion incorporate mass forces. The study may be used in modeling the behavior of arteries or veins in the case when the human organism is subjected to prolonged or short-term acceleration stresses.

B J

**A78-51394** # Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity (Dykhatel'naiia aktivnost' mitokhondrii v kletkakh kornei kukuruzy, vyrashchen'nykh v usloviakh izmenennoi sily tiazhesti). M G Tairbekov, E S. Mailian, and A N Rozov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR) *Akademiia Nauk SSSR, Doklady*, vol 241, July 1, 1978, p 238-241. 7 refs. In Russian.

**A78-51459** # Real-time compression of ECG data - Technical realization (La compressione dei tracciati ECG in tempo reale - Tecniche realizzative). T. Bucciarelli, P. T. Melacci, A. Petroselli, G. Picardi (Perugia, Università, Perugia, Italy) *Alta Frequenza*, vol 47, Aug 1978, p 629-635. 8 refs. In Italian. Consiglio Nazionale delle Ricerche Contract No. 76.00497.07.

It is shown that the Karhunen-Loeve transform can be used for the optimum compression of ECG data. This is confirmed by a theoretical model which allows for the extension of the procedure to three dimensional compression. A real time digital system, based on the Karhunen-Loeve transform, is proposed for the compression of ECG data, the system assures low cost and guarantees reconstruction of the data within acceptable error-limits.

B J

**A78-51498** # A review of human factors engineering studies at Aeromedical Laboratory. H. Hagihara (Japan Air Self Defense Force, Aeromedical Laboratory, Tachikawa, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 18, Mar 1978, p 177-190. 106 refs. In Japanese, with abstract in English.

Twenty years of human factors studies for aviation are summarized. The studies concerned human factors in relation to aircraft design and operation, anthropometry equipment, pilot behavior, display and instrument/control arrangement, flight training and performance grades, life support systems, pilot performance under varying flight conditions, and test and research equipment.

P T H

**A78-51499** # Reviews on research and development with respect to the life support equipments in JASDF and its perspectives. T. Kitano (Japan Air Self Defense Force, Aeromedical Laboratory, Tachikawa, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 18, Mar 1978, p 191-197. 28 refs. In Japanese, with abstract in English.

The paper reviews research and development efforts pertaining to life support equipment, including helmets, oxygen masks, anti-G suits, anti-exposure suits, pressure suits, life rafts, and survival kit. A highlight is the description of an improved retention mechanism for the oxygen mask when the pilot is subjected to high sustained positive G.

P T H

**A78-51500** # Visual problems of pilots - Study on distance judgement of pilots. K. Mizumoto (Japan Air Self Defense Force, Aeromedical Laboratory, Tachikawa, Japan) *Japan Air Self Defence Force, Aeromedical Laboratory, Reports*, vol 18, Mar 1978, p 199-207. 48 refs. In Japanese, with abstract in English.

Visual characteristics of pilots during final approach, landing, and in flight were analyzed from the viewpoint of distance judgment. It is found that sizes and shapes of the retinal images (visual angles) are important visual cues for the judgment of distance from the runway during final approach and from other aircraft during flight. Pilots with monocular vision can use these cues only if they know the real size and shape of the runway or other aircraft. Binocular visual cues such as convergence and binocular parallax are of great use immediately before touchdown or in formation flying. It is concluded that persons with monocular vision are not suited as pilots.

P T H

**A78-51640** # Design of a system of man-computer communication (Navrh systemu komunikacie cloveka s pocitacom). P. Horvath and D. Pauer (Vysoka Skola Technicka, Bratislava, Czechoslovakia) *Automatizace*, vol 21, July 1978, p 183-186. 5 refs. In Slovak.

A systems approach is taken to the description of voice communication between computer and operator. A block diagram of a man-computer-man system where communication is telephonic in nature is presented. Attention is given to means for carrying on a dialogue between man and computer and to the elaboration of programs for such dialogues.

B J

**A78-51661** # The role of a decrease in body heat content in the thermoregulatory response of ear passageways (Rol' snizheniia teplosoderzhanii organizma v termoregulatornoi reaktsii sosudov ushnoi rakoviny). N. A. Slepchuk and G. V. Rumiantsev (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, June 1978, p 843-849. 16 refs. In Russian.

The effect of the introduction into the stomach region of water at 23-29°C on the thermoregulatory constriction of ear vessels in rabbits was studied experimentally with the use of inserted thermocouples. When the ambient temperature was 28-30°C, the heat loss caused by the introduction of the colder water (stored in a balloon filled through a fistula) was calculated to be about 266 cal/kg. Patterns of heat changes in various parts of the body were determined, and it is suggested that the decrease in body heat is responsible for triggering the thermoregulatory response in the ears.

M L

**A78-51662 #** Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia (Znachenie glikoliza v tkaniakh pri sochetannom vozeistvii giperkapnii, gipoksii i gipotermii) V I Baev, Z A Volkova, and N A Maksimov (Leningradskii Pediatricheskii Meditsinskii Institut, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, June 1978, p 858-863 23 refs In Russian

**A78-51841** The effect of sound duration on annoyance K Hiramatsu, K Takagi, T Yamamoto (Kyoto University, Kyoto, Japan), and J Ikeno (C Itoh and Co, Ltd, Tokyo, Japan) *Journal of Sound and Vibration*, vol 59, Aug 22, 1978, p 511-520 19 refs

The duration effect is defined as a trading relation between noise duration and sound pressure level for equal subjective magnitudes. An experimental study is discussed which was undertaken to measure the slope of the duration effect and determine whether this effect is dependent on duration or sound level. In the experiments, ten male and ten female subjects with normal hearing acuity judged by magnitude estimation the relative annoyance of white-noise bursts with durations of 30 ms to 90 s and peak sound levels of 60 to 90 dB. The results obtained show that (1) the logarithm of annoyance ratio increases linearly with the logarithm of duration, (2) the slope of the duration effect steepens with increasing noise level, (3) equal annoyance contours are hyperbolic, indicating that the duration effect is dependent on duration, and (4) the average slope of the effect can be expressed as 3.4 dB per doubling of the duration if the interaction between duration and sound pressure level is neglected F G M

**A78-51847** Bleeding into inner ears of chinchillas caused by simulated sonic boom S Reinis (Waterloo, University, Waterloo, Ontario, Canada) *Journal of Sound and Vibration*, vol 59, Aug 22, 1978, p 611-614 14 refs Research supported by the Ministry of Transport of Canada

**A78-51856** Egocentric orientation is influenced by trained voluntary cyclorotary eye movements R Balliet and K Nakayama (Smith-Kettlewell Institute of Visual Sciences, San Francisco, Calif) *Nature*, vol 275, Sept 21, 1978, p 214-216 23 refs Research supported by the Smith Kettlewell Eye Research Foundation, Grants No NIH-EY-01582, No NIH-EY-01186

Humans trained to make conjugate voluntary cyclorotational eye movements up to 30 deg in magnitude by means of a feedback procedure were found to experience a number of striking illusions related to the individual's sense of body orientation. These illusions include a feeling that the head and body were 'rolling laterally', intermittent sensations of stomach nausea, headache, and general body fatigue, and 'hallucinatory barrage' associated with eyelid tremor. Quantitative observations of the comparatively constant and mild sensory illusion of body tilt are reported. The findings suggest the possibility of shared mechanisms affecting the stability of one's internal frame of reference for both eye and body movements M L

**A78-51871 \*** Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation R F Haines (NASA, Ames Research Center, Man Vehicle Systems Research Div, Moffett Field, Calif) *American Journal of Optometry and Physiological Optics*, vol 54, June 1977, p 387-398 24 refs

Simple onset response time (RT) experiments, previously shown to exhibit binocular summation effects for white stimuli along the horizontal meridian, were performed for red and green stimuli along 5 oblique meridians. Binocular RT was significantly shorter than monocular RT for a 45 min diameter spot of red, green, or white light within eccentricities of about 50 deg from the fovea. Relatively large meridian differences were noted that appear to be due to the degree to which the images fall on corresponding retinal areas.

(Author)

**A78-51872 \*** A subcutaneous channeling probe for implanting long leads G F Lund, R C Simmonds, and B A Williams (NASA, Ames Research Center, Moffett Field, Calif) *Laboratory Animal Science*, vol 27, Dec 1977, p 1039-1041

The channeling probe described in the present paper was designed to overcome surgical problems of the type that were encountered when a multichannel radio transmitter had to be implanted in a cow. The probe was made of a flexible but sufficiently stiff 9.5-mm-diam nylon rod, consisting of 46-cm sections for convenience in sterilization and surgical handling. Stainless steel sleeves reinforced the threaded connecting joints. At one end, arrowhead-shaped channeling heads could be attached to produce wide channels for large sensors. The other end was tapered for narrow channels. Postoperative problems were not encountered in the use of this probe in cows, sheep, and dogs V P

**A78-51873 #** Studies on the light and dark adaptation system in the retina S Yamane *Electrotechnical Laboratory, Researches*, no 777, Dec 1977 72 p 77 refs In Japanese, with abstract in English

The purpose of the paper is to elucidate through experimental evidence the mechanism of light and dark adaptation in retinal cells. Light is shed on the desensitization, photoelectric conversion, and information processing systems in the retina P T H

**A78-51875 \*** Sensory components of bite-force response in the rat N G Daunt (NASA, Ames Research Center, Neurosciences Branch, Moffett Field, Calif) *Journal of Comparative and Physiological Psychology*, vol 91, no 1, 1977, p 203-220 10 refs

**A78-51887 #** Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data (Deprywacja sensoryczna i izolacja społeczna jako problemy psychologii kosmicznej - Eksplikacje badań Antarktycznych i eksperymentalnych) J Terelak, K Kwarecki (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland), and S Rakusa-Suszczewski (Polska Akademia Nauk, Instytut Ekologii, Dziekanow, Poland) *Postępy Astronautyki*, vol 11, no 2, 1978, p 7-31 67 refs In Polish

The paper reviews data gathered in the Arctic and Antarctic as well as laboratory data on sensory deprivation and social isolation. Mechanisms of psychological adaptation to extreme conditions are discussed. It is noted that the results of these investigations may be used for the selection and training of astronauts as a preparation for prolonged space flight B J

**A78-51951** Smooth eye tracking and the perception of motion in the absence of real movement M J Morgan (Durham, University, Durham, England) and D F Turnbull (Cambridge University, Cambridge, England) *Vision Research*, vol 18, no 8, 1978, p 1053-1059 19 refs

A target moving physically in discrete spatial jumps could elicit smooth tracking eye movements in practised observers, but this tracking was increasingly interrupted by saccades when the temporal interval between the spatial jumps of the target was greater than 150

msec. A target that could elicit and sustain smooth tracking appeared perceptually to be moving continuously, rather than discretely, even when the eyes were voluntarily prevented from following the target. An objective measure of this perceived continuity of an apparently moving target, based upon the effects of an interocular delay on apparent depth, showed that perceptual continuity also broke down when the inter-flash interval exceeded a critical value. However, the breakdown in perceived continuity began at a smaller inter-flash interval than the breakdown in smooth pursuit. These results are discussed in relation to the hypothesis that the neural mechanism underlying smooth eye tracking may also be involved in the perception of continuous motion, even when overt eye movements are voluntarily prevented. (Author)

**A78-51952** The effect of luminance on human smooth pursuit of perifoveal and foveal targets. B. J. Winterson and R. M. Steinman (Maryland, University, College Park, Md.) *Vision Research*, vol 18, no 9, 1978, p 1165-1172. 22 refs. Grant No. NIH-EY-00325.

**A78-51953** How presaccadic gratings modify postsaccadic modulation transfer function. W. Wolf, G. Hauske, and U. Lupp (München, Technische Universität, Munich, West Germany) *Vision Research*, vol 18, no 9, 1978, p 1173-1179. 55 refs. Deutsche Forschungsgemeinschaft Contract No. SFB-50.

Threshold modulations for sinusoidal gratings tachistoscopically presented on the fovea after a saccade were determined as a function of the spatial frequency of a peripheral grating at the saccade goal and compared with thresholds of the 'resting eye' condition. The results show a clear enhancement for medium spatial frequency gratings (3.2 c/deg) with peripheral gratings of the same spatial frequency. Therefore an information transfer from periphery to centre induced by saccadic eye movements is suggested. Suppression of low spatial frequency gratings (0.5 c/deg) is found to be independent from additional peripheral gratings and interpreted as an effect of a central inhibitory process elicited by the saccadic motor command. Some aspects concerning saccadic suppression, refixation, and visual stability are considered. (Author)

**A78-51954** Contrast sensitivity during saccadic eye movements. F. C. Volkman (Smith College, Northampton, Mass.), L. A. Riggs, R. K. Moore (Brown University, Providence, R.I.), and K. D. White (Florida, University, Gainesville, Fla.) *Vision Research*, vol 18, no 9, 1978, p 1193-1199. 54 refs. NSF Grants No. GB-41103, No. BNS-74-01135.

The experiment measured contrast sensitivity of three human observers to sinusoidal gratings presented in 10 msec exposures. The gratings were presented to the steadily fixating eye and during 6 deg horizontal saccades. Experimental conditions of viewing in a Ganzfeld reduced possible effects of contour masking. The use of horizontal gratings minimized retinal smear. Results showed a significant suppression of sensitivity (more than 0.6 log unit of contrast) to low spatial frequency gratings presented during saccades. The magnitude of saccadic suppression decreased as spatial frequency of the gratings increased. We conclude that optical and neural effects combine in normal viewing to produce saccadic suppression. Minimizing the optically originating effects of contour masking and retinal image smear failed to eliminate the considerable impairment of vision that occurs during a saccadic eye movement. (Author)

**A78-51955** Binocular interactions during establishment of McCollough effects. K. D. White, H. M. Petry, L. A. Riggs, and J. Miller (Brown University, Providence, R.I.) *Vision Research*, vol 18, no 9, 1978, p 1201-1215. 63 refs. Grant No. NIH-EY-00744.

In four experiments we have shown that a McCollough color aftereffect (CAE) built up through one eye may or may not be influenced by simultaneous stimulation of the other eye, depending on the kinds of similarity and dissimilarity between the two views. Binocular rivalry-produced suppression is not effective per se. However, there is a specifically binocular component that contributes strength to the CAE, and true interocular transfer takes place when facilitated by monochromatic stimulation of the two eyes. The

establishment of CAE strength can also be impeded under certain conditions of dichoptic viewing. (Author)

**A78-51956** Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast. J. J. Kulikowski (University of Manchester Institute of Science and Technology, Manchester, England) and A. Gorea (University of Manchester Institute of Science and Technology, Manchester, England, Paris V, Université, Paris, France) *Vision Research*, vol 18, no 9, 1978, p 1223-1227. 17 refs. Science Research Council Grant No. B/RG/1511.

Incremental (masking) and adaptation contrast thresholds were measured for sinusoidal gratings of different spatial frequencies presented either in an on-off mode or reversed in contrast, at different temporal rates. It is shown that whenever the masking grating stimulates other mechanisms than those concerned with the detection of the test stimulus, the ratio of contrast (test)/contrast (mask) is not constant, thereby indicating a departure from Weber's law. It is concluded that Weber's law directly reflects complete adaptation of the stimulated pattern and/or movement mechanism. (Author)

**A78-51957** A facilitation effect in orientation discrimination. J. L. Brown and I. M. Kortela (Rochester, University, Rochester, N.Y.) *Vision Research*, vol 18, no 9, 1978, p 1239-1246. 13 refs. Contract No. N00014-67-A-0389, Grant No. NIH-EY-000680.

A study has been made of test-spot threshold luminance for orientation discrimination as a function of stimulus onset asynchrony. The test setup consisted of four channels for the presentation of a Maxwellian view of stimulus fields. Data are plotted in terms of luminance in log microlamberts as a function of stimulus onset asynchrony. Data for two subjects are compared and statistical analyses are performed. A study of variance of threshold data for the two subjects is presented for classifications of stimulus onset asynchrony blocks, spatial separation, and stimulus orientation.

S C S

**A78-51990 \* #** Manned maneuvering unit - A space platform support system. C. E. Whitsett, Jr. (NASA, Johnson Space Center, Houston, Tex.), J. A. Lenda, and J. T. Josephson (Martin Marietta Aerospace, Denver, Colo.) *American Institute of Aeronautics and Astronautics, Conference on Large Space Platforms: Future Needs and Capabilities*, Los Angeles, Calif., Sept. 27-29, 1978, Paper 78-1663. 9 p. 5 refs.

The assembly and evaluation of large space platforms in low earth orbit will become practical in the Shuttle era. Extravehicular crewmembers, equipped with manned maneuvering units (MMUs), will play a vital role in the construction and checkout of these platforms. The MMU is a propulsive backpack with mobility extending the crew's visual, mental, and manipulative capabilities beyond the cabin to on-the-spot assembly and maintenance operations. Previous MMU experience is reviewed, Shuttle MMU design features related to space platform support are described, and the use of the MMU for specific construction and assembly tasks is illustrated. (Author)

**A78-51997 #** Spacelab life support and habitability systems growth for extended mission durations. A. Drtil, G. Kring, and W. Mukrowsky (Dornier System GmbH, Friedrichshafen, West Germany) *American Institute of Aeronautics and Astronautics, Conference on Large Space Platforms: Future Needs and Capabilities*, Los Angeles, Calif., Sept. 27-29, 1978, Paper 78-1672. 11 p. 6 refs.

Major life-support and habitability functions and their realization in the presently developed Spacelab are described, and necessary provisions for extending mission durations or crew sizes are considered. Factors examined with respect to extended missions include increase in nitrogen and oxygen supply, removal of CO<sub>2</sub> and contaminants, storage of condensate water, and filtering of the gas loops. It is concluded that present design principles and technologies can be utilized for mission extensions up to at least 30 days, except for the problem of CO<sub>2</sub> removal, which is discussed. M. L.

**A78-52274 # Effect of impulse accelerations on the condition of the cardiovascular system of healthy people (Vlianie impul'snykh uskorenii na sostoianie serdechno-sosudistoi sistemy u zdorovykh liudei)** P O Viazitskii, A I Sergeev, and L N Shepak *Voenna-Meditsinskii Zhurnal*, July 1978, p 57-59 In Russian

The effect of impulse accelerations in the chest-back direction on the cardiovascular systems of 33 male subjects was studied. Each subject was exposed to the accelerations an average of 4 times during 3.4 hrs, the acceleration varied from 2.3 to 3.5 g over 0.017-0.148 sec so that the rate of increase varied from 53 to 370 g/sec. It is found that the accelerations cause a reduction in myocardial contractility. Hemodynamic effects are described. M L

**A78-52275 # Autogenic training in a practical course of summer instruction of student pilots (Autogennaiia trenirovka v praktike letnogo obucheniia kursantov-letchikov)** V S Lozinskii *Voenna-Meditsinskii Zhurnal*, July 1978, p 60-62 9 refs In Russian

Student pilots participated two or three times a week in group sessions with a psychologist who guided the group in autogenic training practices based on Schultz's principles, and the beneficial effects of this form of training are described. Each student also followed the autogenic training method independently 2-3 times a day. The effects of training before sleep on the eve of a flight, of training before flight, and of training after completion of the flight assignment are discussed. It is found that autogenic training improves emotional stability and the quality of learning. M L

**A78-52372 Mechanism for the formation of synaptic projections in the arthropod visual system** E R Macagno (Columbia University, New York, N Y) *Nature*, vol 275, Sept 28, 1978, p 318-320 16 refs Grants No NIH NS-117338, No NIH NS-09821, No NIH-RR-00442

The reported study of the development of the Daphnia visual system clarifies the relation between the ommatidia axons and the cartridge neurons with which they synapse. Deletion experiments show that the reticular fibers recruit whatever immature laminar neurons are closest to the anterior surface and the midline of the laminar anlage. The order of synaptic projections is a consequence of the spatiotemporal sequence of ingrowth of optic fibers, and no special affinity of ommatidia for specific targets is required. The degeneration of laminar cells deprived of contacts suggests that cell death is the mechanism for regulating relative numbers of neurons in this system. M L

**A78-52400 # A microcinematographic method of studying the rate of circulation in the brain capillaries (Mikrokinematograficheskii metod issledovaniia skorosti krovotoka v kapillarakh mozga)** Iu I Levkovich and M K Kalinina (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Zhurnal Nauchnoi i Prikladnoi Fotografii i Kinematografii*, vol 23, July-Aug 1978, p 269-275 7 refs In Russian

A very small movie camera system for studying blood circulation in the brain is described. Blood vessels 3.6 microns in diameter can be photographed even if they are in deep layers. The rate of erythrocyte movement can be determined by a time lapse projection procedure. Parameters, implementation, and validation of the procedure are reported. M L

**A78-52444 Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells** K Fukurotani, H Hase, and K I Hara (Toyama University, Takaoka, Japan) *Electronics and Communications in Japan*, vol 60, Aug 1977, p 88-96 19 refs Translation

A study is made of the response properties of L type, R/G-type, and Y/RB type horizontal cells of the carp, noting the influence of background light on the spectral response curves of the horizontal cells. The interactions between cones and horizontal cells are

evaluated with reference to the morphological patterns of the synaptic connections. S C S

**A78-52497 # Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation (Zwei Methoden zur Untersuchung der Visuellen Ortswahrnehmung aus syntetisch erzeugten Darstellungen für die Flugsichtsimulation)** G Dorfel Meckenheim, Forschungsinstitut für Anthropotechnik (Forschungsinstitut für Anthropotechnik, Bericht, No 33), 1977 68 p 42 refs In German \$5 25

In connection with the visual scene simulation provided with computer generated images, the question arises concerning the degree to which the content of these representations can be reduced without reducing in an inadmissible way the visual information content needed by the pilot for the control of the aircraft. An investigation was conducted with the aim to find methods which can be used to obtain an answer to this question. The effect of the form of the representation on the visual determination of positional variables by pilots and nonpilots was studied. It was found that the evaluation errors increase with decreasing visual information content. There were distinct differences between results obtained for pilots and nonpilots. G R

**A78-52499 # Contributions regarding work load measurement and learning behavior in simulated STOL approaches (Beiträge zur Beanspruchungsmessung und zum Lernverhalten in simulierten STOL-Anflügen)** C Pfendler and G Johannsen Meckenheim, Forschungsinstitut für Anthropotechnik (Forschungsinstitut für Anthropotechnik, Bericht, No 30), 1977 68 p 66 refs In German \$5 25

Subjects without flight experience, who had been trained, performed manual ILS approaches in a fixed base STOL simulator. In addition to performance parameters the work load was measured with the aid of a secondary task (tapping) and a graphic rating scale. The performance of a subject after training was comparable to the performance of an experienced pilot. The suitability of the secondary task and the rating scale for the measurement of the work load at the considered flight control task was studied in a number of experiments. The methods used in connection with the experiments are derived from relations of test theory. G R

**A78-52537 Effect of altitude on dietary induced thermogenesis at rest and during light exercise in man** M J Stock, N G Norgan, A Ferro Luzzi, and E Evans (Queen Elizabeth College, London, Loughborough University, Loughborough, England, Istituto Nazionale della Nutrizione, Rome, Italy) *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 345-349 30 refs Research supported by the Foreign Ministry of Italy

Six volunteer subjects (4 M, 2 F) aged 29-40 yr are tested to evaluate the effect of altitude by measuring thermic responses at rest and during work, as well as to observe these changes during acclimatization. It is found that the fasting resting metabolic rates exhibit an initial increase at altitude followed by a decrease, the same pattern is observed when the results are expressed per kg body weight. The changes in the energy cost of the fasting exercise follow a very similar pattern to those at rest, i.e., an initial increase followed by a decline that is maintained even upon descent to low altitude. An increase in resting metabolic rate after the meal is observed. The changes in the resting and exercising thermic responses show the same trends, but resting responses are not so severely affected. S D

**A78-52538 Effects of exercise, altitude, and food on blood hormone and metabolite levels** M J Stock, C Chapman, J L Stirling, and I T Campbell (Queen Elizabeth College, London, Leeds General Infirmary, Leeds, Southend General Hospital, Southend, Essex, England) *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 350-354 26 refs



Results are presented for an experimental investigation of six human subjects (4 M, 2 F), designed to assess the effect of altitude on several blood metabolite and hormone levels (glucose, free fatty acids (FFA), insulin, and thyroid hormones) in fed and fasting subjects at rest and after 20 min of light exercise. It is found that altitude potentiates the rise in plasma FFA due to exercise, and that the changes in the circulating levels of the thyroid hormones parallel the changes in FFA. A strong positive correlation is established between plasma thyroxine and plasma FFA concentrations. Possible causes of these parallel changes and their relation to changes in energy metabolism are discussed. S D

**A78-52539 \*** Regional lung expansion at total lung capacity in intact vs excised canine lungs. P. A. Chevalier, J. R. Rodarte (Mayo Clinic and Mayo Foundation, Rochester, Minn.), and L. D. Harris. *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 363-369. 10 refs. Grants No. NIH-HL 04664, No. NIH HL 21584, No. NIH HL-19025, No. NIH-RR-00007, No. NGR 24-003-001, No. PHS HL-70816, Contract No. F49620-76 C-0001.

**A78-52540** Oxygen consumption during constant-load exercise. J. M. Hagberg, J. P. Mullin, and F. J. Nagle (Wisconsin University, Madison, Wis.). *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 381-384. 23 refs.

Experiments were carried out on 18 volunteer male subjects (20-33 yr) exercising on a bicycle ergometer for 20 min at 65 and 80% of maximal oxygen uptake. The objective was to assess the possible role of substrate utilization, rectal temperature, and ventilation in causing the slow rise of oxygen uptake during constant-load exercise, and to study the possibility of an explanation based on lactate metabolism. It is shown that the slow rise of oxygen uptake during constant load work is evident at both work loads. No evidence in support of the lactacid explanation for this rise is found. The data indicate that the cause of the slow increase in oxygen uptake is primarily a temperature effect. The total calculated effect of the three calorogenic factors - ventilation, temperature, respiratory quotient - could account for 60% of the rise in oxygen uptake at the lower work load and for all of the rise in oxygen uptake at the higher work load. S D

**A78-52541** Plasma volume changes with movement to supine and standing positions. R. D. Hagan, F. J. Diaz, and S. M. Horvath (California University, Santa Barbara, Calif.). *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 414-418. 24 refs. Grant No. NIH AG 00021.

The chronology of hemoconcentration and hemodilution associated with changes in posture, and the reliability of venous hematocrit (Hct), hemoglobin (Hb), and plasma proteins (PP) as indicators in evaluating changes in plasma volume were determined in seven male subjects. Red cell mass was also measured by the CO method at the termination of the erect and supine positions. Movement to and from supine and erect positions produced consistent, rapid, and progressive changes in Hct, Hb, and PP. Thirty-five minutes in a supine position resulted in a 440-ml expansion of plasma volume. Resumption of the standing position resulted in an increase of 10.3 and 10.8% for Hct and Hb, respectively, and an increase in PP of 20.8%. A fluid efflux of 593 ml reduced blood and plasma volume by 9.5 and 16.2%, respectively. Red cell mass was unaffected by changes in posture. The significance of these postures on the reported alterations in plasma volumes consequent to the imposition of stresses on man are discussed. (Author)

**A78-52542** Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Role of carotid chemoreceptors. J. A. Neubauer, R. S. Feldman, J. T. Huang, J. Vinten Johansen, and H. R. Weiss (Rutgers University, Piscataway, N.J.). *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 419-424. 18 refs. Grant No. PHS HL 21172.

The effects of inspiration of low O<sub>2</sub> and/or high CO<sub>2</sub> gas mixtures on relative tissue PO<sub>2</sub> and perfusion of brain and muscle were studied in 60 pentobarbital anesthetized spontaneously respiring rats. These animals were studied in intact condition, after administration of phenoxybenzamine hydrochloride, 2 mg/kg, or after bilateral denervation of their carotid bodies. In the intact rats, the relative tissue PO<sub>2</sub> ratio of biceps brachii to cerebral white matter always decreased after exposure to the above gas mixtures. This indicated a better maintenance of O<sub>2</sub> supply to demand in the brain than in muscle. After either carotid denervation or alpha adrenergic blockade, this change in the ratio was no longer significant. Further, cerebral blood flow responses to these gas mixtures were attenuated (avg +5.3%) compared to previous work in intact rats. It is concluded that the brain is best protected against hypoxia and/or hypercapnia when the carotid chemoreflex is intact. (Author)

**A78-52543 \*** Evaporative water loss in man in a gravity free environment. C. S. Leach, J. I. Leonard, P. C. Rambaut, and P. C. Johnson (NASA, Johnson Space Center, Space Research and Operations Div., General Electric Co., Baylor University, Houston, Tex.). *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 430-436. 31 refs.

Daily evaporative water losses (EWL) during the three Skylab missions were measured indirectly using mass and water balance techniques. The mean daily values of EWL for the nine crew members who averaged 1 hr of daily exercise were: preflight 1,750 ± or 37 (SE) ml or 970 ± or 20 ml/sq m and in-flight 1,560 ± or 26 ml or 860 ± or 14 ml/sq m. Although it was expected the EWL would increase in the hypobaric environment of Skylab, an average decrease from preflight sea-level conditions of 11% was measured. The results suggest that weightlessness decreased sweat losses during exercise and possibly reduced insensible skin losses. The weightless environment apparently promotes the formation of an observed sweat film on the skin surface during exercise by reducing convective flow and sweat drizzle, resulting in high levels of skin wettedness that favor sweat suppression. (Author)

**A78-52544** Impedance cardiography for estimating cardiac output during submaximal and maximal work. Y. Kobayashi, Y. Andoh, T. Fujinami, K. Nakayama, K. Takada, T. Takeuchi, and M. Okamoto (Chukyo University, Nagoya City University, Nagoya, Japan). *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept 1978, p 459-462. 17 refs.

Impedance cardiography was used to estimate cardiac output in 10 men during rest and within 5 s after exercise on a bicycle ergometer, including work up to and including maximal aerobic capacity. An indwelling venous catheter permitted simultaneous sampling of venous blood for observing changes in hematocrit associated with each exercise level. Cardiac output, calculated from a standard equation which assumes a constant value of 150 ohm cm for the electrical resistivity of blood, was compared with corresponding calculations in which blood resistivity was individually determined as a function of hematocrit. It is concluded that many of the discrepancies in the literature related to values for cardiac output obtained during exercise by the impedance method may be inherent in calculations that do not consider the changing electrical resistivity of the blood with a changing hematocrit. (Author)

**A78-52545** Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise. K. Sahlin, A. Alvestrand, R. Brandt, and E. Hultman (St. Eriks Sjukhus, Serafimer lasarettet, Stockholm, Sweden). *Journal of Applied Physiology, Respiratory, Environmental and Exercise Physiology*, vol 45, Sept

1978, p 474-480 32 refs Research supported by the Swedish Medical Research Council SMRC Project B77 19X-1002-12C, SMRC Project B77 19X-2647-090

**A78-52631 \*** Regions of differential cell elongation and mitosis, and root meristem morphology in different tissues of geotropically stimulated maize root apices J Shen Miller, R E McNitt, and M Wojciechowski (Argonne National Laboratory, Argonne, Ill) *Plant Physiology*, vol 61, 1978, p 7 12 21 refs NASA-ERDA supported research

**A78-52636** Objective assessment of prior air traffic control-related experience through the use of an occupational knowledge test M A Lewis (FAA, Civil Aeromedical Institute, Oklahoma City, Okla) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1155-1159

The sample used in the study comprised 784 ATC trainees who took the ATC Occupational Knowledge Test (OKT) 101 B, and among them 701 passed training and 83 failed The objective was to determine whether it would be productive to use the OKT 101-B to assign extra credit in place of the present ATC rating guide Recommendations are made about implementation of any new system of assigning extra credit using OKT The discussion reveals that the OKT could be a practical means of assigning extra credit to ATC applicants with useful aviation knowledge It appears that the OKT would improve current methods of allowing extra credit for experience because it relates to the quality rather than to the quantity of past experience In particular, the use of the OKT to replace the assessment of past experience would be a very cost effective means of assigning extra credit S D

**A78-52637** Gas elimination during a single-stage decompression T E Berghage, C V Dyson, and T M McCracken (National Naval Medical Center, Naval Medical Research Institute, Bethesda, Md) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1168 1172 15 refs

The relationship between hydrostatic pressure and gas-exchange asymmetry is studied by exposing 895 female albino rats to pressures of 20, 30, and 40 ATA for a time enough to bring them into equilibrium with the ambient pressure environment A two step single-stage decompression is applied to a point where 50% of the animals showed signs of decompression sickness The results obtained indicate that (1) gas uptake during compression is much faster than gas elimination during decompression, (2) the time for gas elimination is an inverse function of saturation exposure pressure, and (3) there exists an optimum time to spend at a decompression stop to maximize the rate of gas elimination S D

**A78-52638** Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work A S Ushakov, V I Miasnikov, B P Shestkov, A N Agureev, M S Belakovskii, and M P Rumiantseva (Ministerstvo Zdravo okhraneniia SSSR, Institut Mediko Biologicheskikh Problem, Moscow, USSR) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1184 1187 7 refs

**A78-52639** Multinational Andean Genetic and Health Program VII - Lung function and physical growth - Multivariate analyses in high- and low-altitude populations W H Mueller, W J Schull (Texas, University, Houston, Tex), F Yen (Lima, Universidad Nacional, Lima, Peru), and F Rothhammer (Universidad de Chile, Santiago, Chile) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1188-1196 22 refs Grants No PHS HL 15614, No PHS GM 19513, No PHS CA 19311, No PHS HL 05266

**A78-52640** Workload and fatigue-in flight EEG changes J S Howitt, A E Hay, G R Shergold, and H M Ferres (Civil Aviation Authority, London, RAF, Institute of Aviation Medicine, Farnborough, Hants, England) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978 p 1197 1202 11 refs

Continuous recordings were made of the EEG and ECG of one pilot during a series of instrument flights in a feeder type transport aircraft The flights were arranged to contain epochs of distinctly differing levels of workload In addition, some flights were made after a night of sleep deprivation and others were made as the second and third flights of the day Subjectively, there appeared to be marked differences in performance between the two types of tired flight The EEG analyses showed changes that correlated well with differences in workload In the highest workload areas during fresh flights, EEG activity increased by approximately a factor of 4 over that of the preflight resting values This large increase did not occur in the tired flights Further experiments are planned using flights in aircraft and in simulators using several subjects (Author)

**A78-52641** Use of path models to study a precareer air traffic control training program J O Boone (FAA, Civil Aeromedical Institute, Oklahoma City, Okla) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1203-1211 9 refs

An attempt is made to determine the unique relationship between predevelopmental training scores and a trainee's ability to achieve success in FAA Academy training, based on path models and variance partitioning techniques It is shown that predevelopmental training substantially enhances a trainee's potential for Academy success, with a possible differential effect due to minority status In addition, path models offer a more objective means to consider the various measures simultaneously and determine unique effects through regression and partitioning techniques Path models are expected to be quite suitable for assessing other aviation-relation programs S D

**A78-52642** Comparison of the vigilance performance of men and women using a simulated radar task R I Thackray, R M Touchstone, and J P Bailey (FAA, Civil Aeromedical Institute, Oklahoma City, Okla) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1215 1218 17 refs

The present study examined the question of possible sex differences in the ability to sustain attention to a complex monitoring task requiring only a detection response to critical stimulus changes The visual display was designed to approximate a futuristic, highly automated air traffic control radar display containing computer generated alphanumeric symbols There were 26 men and 26 women tested, each over a 2-h session Sixteen targets appeared on the screen at all times, with 10 signals (a designated change in the alphanumerics) randomly presented during each 0.5 h of the test session Detection latency to the signals increased significantly during the session, but there was no evidence of any significant differences between the sexes in the magnitude or pattern of this increase The results are discussed in terms of a general decline in alertness that was apparently equal for both sexes (Author)

**A78-52643** Effects of fracture trauma, estrone treatment, and a 2-G environment on the epiphyseal cartilage zones of developing avian radii J A Negulesco (Ohio State University, Columbus, Ohio) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1219 1224 25 refs Research supported by the Ohio State University

**A78-52644** US fatal general aviation accidents due to cardiovascular incapacitation 1974-75 S R Mohler (FAA, Aero medical Applications Div, Washington, D C) and C F Booze (FAA, Civil Aeromedical Institute, Oklahoma City, Okla) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1225-1228

National Transportation Safety Board records for the 1974 75 period indicate that 13 general aviation fatal accidents resulted from cardiovascular incapacitation, with an average of about six per year The paper presents information on these cases, explores the implications, and discusses preventive measures The pilots were aged in the range 33-68 yr with both a mean and a median of 52 The relatively large number of pilots in the 50-59 yr age bracket (7 of the 13 cases) is consistent with the chronic nature of the pathogenesis of atherosclerotic coronary heart disease Since these 13 inflight cardiovascular incapacitations constitutes 0.93% of the total of 1404

fatal general aviation accidents in the 1974-75 period, extensive additional cardiovascular screening procedures are not justified at present on cost/yield basis S D

**A78-52645** **Movement by helicopter of patients with decompression sickness** E J Reddick (U S Army, Aeromedical Center, Fort Rucker Ala.) *Aviation, Space, and Environmental Medicine* vol 49 Oct 1978, p 1229, 1230 8 refs

Compression in a hyperbaric chamber is known to be the treatment of choice for pilots afflicted with decompression sickness. However, a problem arises when the treatment facility is located a substantial distance from the patient with decompression sickness. Six cases of decompression sickness are considered: five cases are pain-only bends with cutaneous manifestations, while the last case presents initially with peripheral paresthesias which slowly developed into central nervous system problems. It is shown that movement of patients with decompression sickness by low-level (within 61 m above ground level) helicopter flight is both safe and effective. Although most patients were on uninterrupted 100% oxygen from 1-4 hr, no cases of oxygen convulsions or oxygen toxicity were observed S D

**A78-52646** **Bleeding duodenal ulcer and the flier** R B Rayman (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) *Aviation, Space, and Environmental Medicine*, vol 49, Oct 1978, p 1231-1234 11 refs

Literature data on treatment of patients with bleeding duodenal ulcer are examined to determine whether rebleeding risk is less with medical or surgical treatment, and whether in either case, the rebleeding risk is low enough to permit, with reasonable prudence, the resumption of aircrew duties. Criteria necessary for the return of airmen with a bleeding duodenal ulcer to aircrew duty are formulated, the most important being (1) the patient has undergone surgery, preferably a vagotomy/antrectomy because of lower recurrent bleeding rate, (2) postoperative recovery is full and normal, (3) 12-24 months have elapsed since surgery, and (4) if a second bleeding episode occurs, the airman should probably be removed permanently from flying status S D

**A78-52698 \*** **Controlled cellular energy conversion in brown adipose tissue thermogenesis** J M Horowitz and R E Plant (California, University, Davis, Calif.) *American Journal of Physiology*, vol 235, Sept 1978, p R121-R129 29 refs. Grants No NGR 05-004-099, No NIH-AM 16716

Brown adipose tissue serves as a model system for nonshivering thermogenesis (NST) since a) it has as a primary physiological function the conversion of chemical energy to heat, and b) preliminary data from other tissues involved in NST (e.g., muscle) indicate that parallel mechanisms may be involved. Now that biochemical pathways have been proposed for brown fat thermogenesis, cellular models consistent with a thermodynamic representation can be formulated. Stated concisely, the thermogenic mechanism in a brown fat cell can be considered as an energy converter involving a sequence of cellular events controlled by signals over the autonomic nervous system. A thermodynamic description for NST is developed in terms of a nonisothermal system under steady state conditions using network thermodynamics. Pathways simulated include mitochondrial ATP synthesis, a Na<sup>+</sup>/K<sup>+</sup> membrane pump, and ionic diffusion through the adipocyte membrane (Author)

**A78-52699 \*** **Circadian rhythm dissociation in an environment with conflicting temporal information** F M Sulzman, C A Fuller, L G Hiles, and M C Moore-Ede (Harvard University, Boston, Mass.) *American Journal of Physiology*, vol 235, Sept 1978, p R175-R180 25 refs. NSF Grant No PCM 76-19943, Grants No NSG 9054, No NIH-GN 22085

The relative contributions of light-dark (LD) cycles and eating-fasting (EF) cycles in providing temporal information to the circadian time-keeping system were examined in chair-acclimatized squirrel monkeys (*Saimiri sciureus*). The circadian rhythms of drinking, colonic temperature, urine volume, and urinary potassium

excretion were measured with the LD and EF cycles providing either conflicting phases or periods. In conflicting phase experiments, animals were exposed to 24-hr LD cycles consisting of 12 hr of 600 lx followed by 12 hr of less than 1 lx and concurrent 24-hr EF cycles in which the animals ate for 3 hr and then fasted for 21 hr. One group had food available at the beginning and a second group at the end of the light period. In conflicting period experiments, monkeys were exposed to 23-hr LD cycles and 24-hr EF cycles. Analysis of the rhythms showed that both phase and period information were conveyed to the drinking and urinary rhythms by the EF cycle, and to the temperature rhythm by the LD cycle (Author)

**A78-52704** **Visual stimulator** V Van Toi (Lausanne, Ecole Polytechnique Fédérale, Lausanne, Switzerland) and P A Grounauer (Lausanne, Clinique Ophtalmologique Universitaire, Lausanne, Switzerland) *Review of Scientific Instruments*, vol 49, Oct 1978, p 1403-1406 12 refs. Research supported by Fritz Hoffman-La Roche's Foundation

An easily portable apparatus for flicker fusion experiments is described. It uses crossed polarizers to produce modulated beams and a light guide made of optical fibers to mix these beams for producing a sinusoidally modulated stimulus of which the frequency, the modulation amplitude, the luminance, the color adaptation light, and the field size can be varied independently (Author)

**A78-53082** **Binocular detection by normal and stereoblind observers** D H Westendorf, A Langston, D Chambers, and C Allegretti (Arkansas, University, Fayetteville, Ark.) *Perception and Psychophysics*, vol 24, no 3, Sept 1978, p 209-214 20 refs. Research supported by the University of Arkansas, Grant No PHS MH 28063-01

Binocular forced choice detection performance was measured in three stereoblind observers and four observers with normal stereopsis. Detection rates of normal observers were greater than expected from probability summation, while those of the stereoblind observers were near or at a level expected from probability. It is concluded that binocular summation is reduced or absent in stereoblind persons (Author)

**A78-53083** **Saccadic eye movements and localization of visual stimuli** S Mateev (B'lgarska Akademiia na Naukite, Institut po Fiziologiya, Sofia, Bulgaria) *Perception and Psychophysics*, vol 24, no 3, Sept 1978, p 215-224 15 refs

Visual localization phenomena were studied before, during, and after a saccade. Light flashes of 5 and 9 msec duration presented before and during the eye movement were mislocated in the saccade direction, the localization error being a time function. When the 9 msec duration stimulus and saccade did not overlap in time, a stripe was reported, when they did not, the stimulus was perceived as a point. If a long-duration stimulus moved perpendicularly to the saccade direction with the same 'sigmoidal' velocity, a curvilinear trace was perceived, regardless of the linear trace of the image on the retina. A stimulus with stabilized retinal image was perceived as a stationary point during the saccade. A possible theory to deal with the data was suggested by modifying the algebra of outflow-inflow theories (Author)

**A78-53084** **Mental rotation under head tilt - Factors influencing the location of the subjective reference frame** M C Corballis, B A Nagourney, L I Shetzer, and G Stefanatos (McGill University, Montreal, Canada) *Perception and Psychophysics*, vol 24, no 3, Sept 1978, p 263-273 17 refs. Research supported by the National Research Council of Canada

Experiments are carried out to examine the subjective reference frame that subjects employ when they mentally rotate simple patterns under head tilt conditions. Particular attention is given to the factors influencing the choice of the subjective vertical. The factors studied comprise the nature and tilt of the surrounding frame, the familiarity with the test stimuli, the instructions given to the subjects, and the degree of head tilt. It is shown that the subjective reference frame is distinct both from the gravitational and retinal frames, and that the gravitational frame exerts the stronger

influence The primacy of a 'retinal factor' in the perception of orientation proves to be questionable S D

**A78-53085 Tachistoscopic perception under head tilt** M C Corballis, T Anuza, and L Blake (McGill University, Montreal, Canada) *Perception and Psychophysics*, vol 24, no 3, Sept 1978, p 274-284 35 refs Research supported by the National Research Council of Canada

An experimental approach was used in which 12 male and 12 female undergraduate class right-handed subjects with normal or corrected-to normal vision tried to identify singly presented letters flashed briefly at six different locations with respect to an imaginary clockface The subjects attempted to identify the letters both with their heads upright and tilted either to the left or to the right The objective was to determine whether the pattern of accuracy scores as a function of position shifted when the subjects tilted their heads The letters were also displayed in two different angular orientations at each location either upright in gravitational space or rotated 60 deg in the same direction as the subject's head was tilted The data obtained suggest that lateral asymmetry in tachistoscopic perception can be decoupled from the anatomy of the reticulocortical projections, and is thus truly perceptual rather than anatomical S D

**A78-53391 Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977** Workshop sponsored by the Institut National de la Sante et de la Recherche Medicale Edited by M Portmann and J M Aran (Bordeaux II, Universite, Bordeaux, France) Paris, Editions INSERM (Institut National de la Sante et de la Recherche Medicale, Colloques Volume 68), 1977 440 p In English and German \$14.81

A collection of papers is presented which deal with physicochemical phenomena that govern the functioning of the normal and pathological inner ear Three main areas are emphasized morphology and particularly ultrastructure, electrophysiological events, and some metabolic and biochemical mechanisms with their correlative ototoxicity Topics of interest include the primary afferent neurons in the hereditarily deaf white cat, the action of GABA and acetylcholine in the labyrinth of the cat, membrane biology of the inner ear hair cell, a rheological model for research on cochlear hypoxia, and effect of gangliosides on the cochlear electrical activity S D

**A78-53392 Fine morphology of the tectorial membrane - Fresh and developmental** D J Lim (Ohio State University, Columbus, Ohio) In *Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977* Paris, Editions INSERM, 1977, p 47-60 28 refs Research supported by the Deafness Research Foundation and U S Air Force

Optical microscopy as well as scanning electron microscopy and transmission electron microscopy are used to gain insight into the fine morphology of the tectorial membrane (fresh and fixed) and its coupling mechanism with the sensory cilia It is found that the fibers observed in fixed tissue are the same as those in fresh tissue The substructures revealed in the fixed tectorial membrane, such as the cover net, marginal complex, Hensen's stripe, and Hardesty's membrane, can also be identified in unfixed tissue, thereby refuting the suggestion that these structures are fixation artifacts The results indicate that the different modes of coupling between the tectorial membrane and the external and internal ciliated cells seem to be related to the developmental stage of the cochlea S D

**A78-53393 Functional evidence of efferent nerve endings in the human inner ear** J Innitzer and K Ehrenberger (Wien, Universitat, Vienna, Austria) In *Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977* Paris, Editions INSERM, 1977, p 137-143 13 refs

Summating potentials which precede the compound action potential of the acoustic nerve are obtained from the human middle

ear It is shown that these summating potentials can be influenced by acoustic stimulation of the contralateral ear In particular, this interaural interaction appears to be caused by efferent neural action through cholinergic pathways S D

**A78-53394 A rheological model for research on cochlear hypoxia** M Rubinstein, M Hildesheimer, C Muchnik, and E Sahrtov (Tel Aviv University, Chaim Sheba Medical Center, Ramat Gan, Israel) In *Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977* Paris, Editions INSERM, 1977, p 289-294 6 refs

An experimental model for studying the effects of hypoxia on the cochlear function is described This model is based on the blood's rheological properties to have a streamline flow pattern and to decrease its rate of flow with an increase in viscosity Blood with very limited oxygen redundancy and high viscosity was injected retrogradely into the axillary artery of guinea pigs A D N infusion pump ensured a controlled rate of flow The ear under examination perfused with this blood showed a slow developing hypoxia which could be halted or reversed to a normoxic state at will Due to this slow development of cochlear hypoxia, four changes in the action potentials could be observed, i.e., unstable threshold, rise in threshold, changes in pattern and periods of supernormal action potentials (AP) amplitude (Author)

**A78 53395 The importance of the perilymphatic oxygen supply in the cochlea function** K D Kuhl, E J Haberland, and P Lotz (Klinik und Poliklinik fur Hals Nasen und Ohrenkrankheiten, Halle, East Germany) In *Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977* Paris, Editions INSERM, 1977, p 295-299

The influence of certain factors on the cochlear microphonics and the perilymphatic oxygen tension in guinea pigs is studied These factors are use of respiratory gases (oxygen, nitrogen, carbon dioxide), perfusion of artificial perilymph with iodized acetic acid and cyanide, electrical stimulation, and elimination of cervical sympathetic system Simultaneous recording of cochlear microphonics and oxygen tension in a perilymphatic perfusion of the cochlea reveals that (1) the time dependence of cochlear microphonics is similar to that of oxygen tension, (2) there is a reduced oxygen uptake when the supply is decreased, the aerobic metabolism is restricted, and specific inhibitors are present and (3) a complex nature of the cochlear microphonics is observed during gradual inhibition of aerobic and anaerobic cochlear metabolisms S D

**A78-53396 Some findings on the inner ear after experimental obliteration of the endolymphatic duct and sac of guinea pigs** W Oshima, M Suzuki, S Shida, and M Machino (Osaka Hospital, Osaka, Japan) In *Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977* Paris, Editions INSERM, 1977, p 313-318 14 refs

Experimental endolymphatic hydrops were produced by obliterating the endolymphatic duct and sac in guinea pigs Pertinent vestibular organs were examined using scanning electron microscopy Attention was given to changes in the sensory cilia It was found that the sensory cilia were damaged most severely in the macula sacculi, and that in the utricle and ampullae the sensory cilia were more damaged in the center than in the margin S D

**A78 53397 A scanning study of acoustic lesions of the cochlea** I M Hunter Duvar (Hospital for Sick Children, Toronto, Canada) In *Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977* Paris, Editions INSERM, 1977, p 385-395 14 refs Research supported by the Medical Research Council of Canada and Hospital For Sick Children

Scanning electron microscopy is used to analyze cochlea specimens of young adult chinchillas exposed to a 1 kHz pure tone stimulus for durations and intensities ranging from 12 min at 120 dB to 3 hr at 90 dB The exposure to pure tone exposure is sufficient to result in temporary or permanent hearing losses as determined by

postexposure audiograms. The usefulness of scanning electron microscopy in assessing the damage to the organ of Corti from acoustic stimulation is clearly demonstrated in the recorded micrographs. The pathological sequence of the damaged cochlea is elucidated. The rapidity and the nature of deterioration of stereocilia on the first outer row of hair cells are striking. The cilia actually appear to agglutinate and then to be consumed during stimulation, leaving the cuticular plate and the tectorial membrane intact. S D

**A78-53398** An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla. D Vertes and I V Nabelek (Tennessee, University, Knoxville, Tenn.) In: Inner ear biology, Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977. Paris, Editions INSERM, 1977, p. 397-403. 7 refs.

An attempt is made to determine the relation between hair cell damage and hearing loss in chinchillas having either noise or drug treatment, and to determine whether this relation is altered by the length of posttreatment period. Attention is given to a comparison of audiometric and histologic evidence of drug- and noise-induced hair cell pathology two and six weeks after the end of treatment. It is shown that hair cell damage and threshold shift as a function of frequency are similar after drug treatment and dissimilar after noise treatment. Furthermore, estimates of hair cell damage, especially after severe cochlear insults, are affected by the length of post treatment period. S D

**A78-53400 \*** Computer display and manipulation of biological molecules. Y Coeckelenbergh, R D MacElroy (NASA, Ames Research Center, Extraterrestrial Biology Div., Moffett Field, Calif.), J Hart (NASA, Ames Research Center, Computation Div., Moffett Field, Calif.), and R Rein (Roswell Park Memorial Institute, Buffalo, N Y). *Computers and Graphics*, vol. 3, 1978, p. 9-16. 20 refs.

This paper describes a computer model that was designed to investigate the conformation of molecules, macromolecules and subsequent complexes. Utilizing an advanced 3-D dynamic computer display system, the model is sufficiently versatile to accommodate a large variety of molecular input and to generate data for multiple purposes such as visual representation of conformational changes, and calculation of conformation and interaction energy. Molecules can be built on the basis of several levels of information. These include the specification of atomic coordinates and connectivities and the grouping of building blocks and duplicated substructures using symmetry rules found in crystals and polymers such as proteins and nucleic acids. Called AIMS (Ames Interactive Molecular modeling System), the model is now being used to study prebiotic molecular evolution toward life. (Author)

**A78-53608 #** Medical and psychological selection and training criteria for European SL-payload specialists. K E Klein and J R Hordinsky (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt, Institut für Flugmedizin, Bonn, West Germany). *American Astronautical Society and Deutsche Gesellschaft für Luft- und Raumfahrt, Goddard Memorial Symposium, 16th, Washington, D C, Mar 8-10, 1978, AAS Paper 78-028*. 32 p. 14 refs.

European participation in the Shuttle-Spacelab program has currently resulted in a relatively large number of experiments to be flown during a period extending to 1985 and also in the participation of payload specialists onboard the Spacelab. This scientific personnel must be screened and trained in preparation to the flights. Instruction and training is about to start. In the present paper, the principles applied during the completed screening process are outlined, the lines along which biomedical training will be conducted are discussed. V P

**A78-53613 #** Life sciences laboratories in Spacelab. G Wirths (Dornier System GmbH, Friedrichshafen, West Germany). *American Astronautical Society and Deutsche Gesellschaft für Luft- und Raumfahrt, Goddard Memorial Symposium, 16th, Washington, D C, Mar 8-10, 1978, AAS Paper 78-011*. 24 p.

The paper deals with the technological and economic aspects of life science laboratories to be flown on Spacelab. The possibilities which accrue from a convection-free environment not only in

biological and medical research but also in the manufacture of such biological materials as special antibiotics and hormones are pointed out. Life science laboratories may be of equal interest to therapeutics, in particular to study the effect of high-energy particles on tumor cells and the use of UV radiation for sterilization purposes. Other possible areas of interest could include healing of wounds, restoration of bones, and treatment of burns. An experiment involving incubators and holding units for cells and tissues, plants, and low vertebrates is discussed. V P

**A78-53615 \* #** The NASA Life Sciences experiment program for Shuttle/Spacelab. D Winter (NASA, Washington, D C). *American Astronautical Society and Deutsche Gesellschaft für Luft- und Raumfahrt, Goddard Memorial Symposium, 16th, Washington, D C, Mar 8-10, 1978, AAS Paper 78-010*. 8 p.

The Life Sciences experiment program for the Shuttle/Spacelab has basically two scientific objectives. The first objective is related to an understanding and interpretation of the medical data from Skylab. The second objective is concerned with a utilization of the space environment, notably the very low g field, as an experimental variable in a broad range of fundamental studies. The program considered will use the pressurized module, almost exclusively, and will aim toward the greatest investigator participation in flight that is possible. Facilities must be provided to support such requirements as tissue biopsies, blood, urine and tissue collections, and microbial and plant manipulations. G R

**A78-53619 \*** The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by *Halobacterium saccharovorum*. G A Tomlinson, M P Strohm (Santa Clara, University, Santa Clara, Calif.), and L I Hochstein (NASA, Ames Research Center, Extraterrestrial Biology Div., Moffett Field, Calif.). *Canadian Journal of Microbiology*, vol. 24, no. 8, 1978, p. 898-903. 21 refs. Grant No. NCA2 OR685 509.

**A78-53624 \*** Response of terrestrial microorganisms to a simulated Martian environment. T L Foster, L Winans, Jr., R C Casey, and L E Kirschner (Hardin-Simmons University, Abilene, Tex.). *Applied and Environmental Microbiology*, vol. 35, Apr 1978, p. 730-737. 18 refs. Grant No. NGR 44-095-001.

Soil samples from Cape Canaveral were subjected to a simulated Martian environment and assayed periodically over 45 days to determine the effect of various environmental parameters on bacterial populations. The simulated environment was based on the most recent available data, prior to the Viking spacecraft, describing Martian conditions and consisted of a pressure of 7 millibars, an atmosphere of 99.9% CO<sub>2</sub> and 0.1% O<sub>2</sub>, a freeze-thaw cycle of 65°C for 16 h and 24°C for 8 h, and variable moisture and nutrients. Reduced pressure had a significant effect, reducing growth under these conditions. Slight variations in gaseous composition of the simulated atmosphere had negligible effect on growth. The freeze-thaw cycle did not inhibit growth, but did result in a slower rate of decline after growth had occurred. Dry samples exhibited no change during the 45-day experiment, indicating that the simulated Martian environment was not toxic to bacterial populations. Psychrotrophic organisms responded more favorably to this environment than mesophiles, although both types exhibited increases of approximately 3 logs in 7 to 14 days when moisture and nutrients were available. (Author)

**A78-53625 \*** Anaerobic utilization of phosphite and hypophosphite by *Bacillus* sp. T L Foster, L Winans, Jr., and S J S Helms (Hardin-Simmons University, Abilene, Tex.). *Applied and Environmental Microbiology*, vol. 35, May 1978, p. 937-944. 16 refs. Grant No. NGR 44-095-001.

A *Bacillus* species capable of using phosphite and hypophosphite under anaerobic conditions was isolated from Cape Canaveral soil samples and grown on a glucose mineral salts medium with phosphate omitted. The optimum hypophosphite concentration was 60 microg/ml, while the optimum phosphite concentration was greater than 1000 microg/ml. P-32 labeled hypophosphite was incorporated



into the cell as organic phosphate, and little or no phosphate appeared in the medium when either hypophosphite or phosphite was the phosphorus source. When phosphate was present in the medium, phosphite was not metabolized. When both phosphite and hypophosphite were present, phosphite was used first and then hypophosphite. M L

**A78-53709 Configuration of the chest wall during increased gravitational stress in erect humans.** A. E. Grassino, L. Forkert, and N. R. Anthonisen (Manitoba, University, Winnipeg, Royal Victoria Hospital, McGill University, Hôpital Notre Dame, Montreal, Université, Montreal, Canada, New York, State University, Buffalo, N.Y.) *Respiration Physiology*, vol. 33, June 1978, p. 271-278. 18 refs. Research supported by the Medical Research Council of Canada.

Magnetometric measurements of changes in the dimensions of the rib cage and abdomen in subjects at plus 1, 2, and 3 Gz (gravitational stress in the vertical direction) were obtained during normal tidal breathing and at a variety of lung volumes during relaxation, and it was found that changes in thoraco-abdominal shape could be summarized by measuring antero-posterior and lateral diameters at the angle of Louis, the xyphisternal junction, and a level one cm cephalad to the umbilicus. The described changes are small, always being less than 10 per cent of the dimensions measured at normal gravity. Since changes in diameter and cross-section of the rib cage were similar to those observed during a Muller maneuver, which decreases gravitational differences in regional lung volume, it is concluded that in erect humans the vertical distribution of regional volumes, and by implication regional pleural surface pressure, is independent of chest wall shape. M L

**A78-53710 The scaling of maximal oxygen consumption and pulmonary dimensions in small mammals.** A. J. Lechner (California, University, Riverside, Calif.) *Respiration Physiology*, vol. 34, July 1978, p. 29-44. 73 refs. Research supported by the University of California.

The paper presents expressions relating the standard rate of oxygen consumption, the maximal rate of oxygen consumption, and the pulmonary surface area to animal weight for both wild and laboratory mammals whose weights extend over the lower half of the total log weight range in mammals. The factorial aerobic scope, which is the ratio of maximum to standard rates of oxygen consumption, is nearly constant over this weight range at approximately 6.6. This finding supports the use of earlier studies (which relate the alveolar surface or pulmonary diffusion capacity to standard rate of oxygen consumption) as models for pulmonary constraints on metabolic rate. The data suggest that, at least for wild species, pulmonary diffusion capacity may limit the maximal rate of oxygen consumption. M L

**A78-53711 Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude.** J. Vincent, M. F. Hellot, E. Vargas, H. Gautier, P. Pasquis, and R. Lefrançois (Rouen, Université, Rouen, France, Instituto Boliviano de Biología de Altura, La Paz, Bolivia) *Respiration Physiology*, vol. 34, Aug. 1978, p. 219-231. 39 refs.

Characteristics of high-altitude natives (HAN) and acclimatized sea-level natives (SLN) at high altitude and in resting conditions were compared, and no differences were detected in alveolar-arterial oxygen difference, alveolar-arterial CO<sub>2</sub> difference, or venous admixture. It is stated that the alveolar-arterial CO<sub>2</sub> difference becomes smaller in SLN after acclimatization because of the minor effect on arterial oxygenation of the probably constant venous admixture and because of the reduction of the ventilation/perfusion ratio inequality as shown by a smaller alveolar-arterial CO<sub>2</sub> difference. Reasons why the diffusing capacity for CO is greater in HAN than in SLN are considered. A transitory increase of the diffusing capacity for CO in SLN during acute hypoxia is noted. M L

**A78-53712 Breathing pattern in men during inspiratory elastic loads.** E. Agostoni, E. D'Angelo, and M. Pioloni (Milano, Università, Milan, Italy) *Respiration Physiology*, vol. 34, Aug. 1978, p. 279-293. 11 refs. Research supported by the Consiglio Nazionale delle Ricerche.

The breathing pattern in men during inspiratory elastic load applied throughout breathing cycle (CL) or inspiration only (DL) is described. Changes in the tidal volume, inspiratory time, expiratory time, and respiration rate are reported. Tidal volume decreased similarly under both loads, while in DL conditions, expiratory flow started after a lag of about 0.4 sec which was required for the alveolar pressure to become higher than atmospheric pressure. Changes with time in the use of inspiratory and expiratory muscles are explained. M L

**A78-53786 # Role of the paradoxical phase in the organization of the sleep-wakefulness cycle in the rat (Rol'paradoksal'noi fazy v organizatsii tsikla Bodrstvovanie-Son u krysa).** I. G. Karmanova, V. F. Maksimuk, A. N. Panov, N. L. Rubinskaya, and O. E. Khomutetskaya (Akademiya Nauk SSSR, Institut Evolyutsionnoi Fiziologii i Biokhimii and Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol. 64, Aug. 1978, p. 1074-1081. 20 refs. In Russian.

**A78-53787 # REM deprivation by stimulation of the reticular formation in the rat (Deprivatsiya 'bystrogo sna' razdrasheniem retikuliarnoi formatsii u krysa).** V. M. Koval'zon and V. L. Tsubul'skii (Akademiya Nauk SSSR, Institut Evolyutsionnoi Morfologii i Ekologii Zhivotnykh, Moscow, USSR) *Fiziologicheskii Zhurnal SSSR*, vol. 64, Aug. 1978, p. 1082-1088. 17 refs. In Russian.

**A78-53788 # Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia (Nekotorye pokazateli kislorodnogo obmena i rezistentnost' krysa k ostroi gipoksii pri posttransfuzionnoi politseimii).** M. M. Shcherba, G. V. Troshikhin, A. M. Volzhskaya, L. S. Maslennikova, and E. I. Rozova (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol. 64, Aug. 1978, p. 1134-1137. 12 refs. In Russian.

**A78-53789 # Effect of hypokinesia on the contractile function and neural regulation of the heart (Vlianie gipokinezii na sokratitel'nyu funktsiiu i nervnuu regulatsiiu serdtsa).** F. Z. Meerson, V. I. Kapel'ko, M. S. Gorina, A. N. Shchegol'kov, and N. P. Larionov (Akademiya Meditsinskikh Nauk SSSR, Moscow, Ministerstvo Zdravookhraneniya SSSR, Meditsinskii Institut, Krasnoyarsk, USSR, Ministerstvo Zdravookhraneniya Ukrainoi SSR, Nauchno Issledovatel'skii Institut Meditsinskikh Problem Fizicheskoi Kul'tury, Kiev, Ukrainian SSR) *Fiziologicheskii Zhurnal SSSR*, vol. 64, Aug. 1978, p. 1138-1144. 20 refs. In Russian.

Results are presented of an experimental study on rabbits regarding the pumping function of the heart along with the contraction and relaxation of the myocardium during prolonged hypokinesia. The data obtained are used to compare the deadaptation of the heart during hypokinesia, the adaptation of the heart to physical exercise, and the compensatory hypertrophy of the heart as cardiac readaptation. It is shown that the observed set of changes is contrary to those occurring during adaptation to physical exercise, but is very close to changes observed during compensatory hypertrophy of the heart. S D

**A78-53790 # Criteria for quantitative evaluation of respiratory system responses (O kriteriakh kolichestvennoi otsenki reaktsii sistemy dykhanii).** I. S. Breslav, G. G. Isaev, N. Z. Klueva, M. A. Pogodin, and A. M. Shmeleva (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol. 64, Aug. 1978, p. 1152-1159. 22 refs. In Russian.

Experiments are conducted on anesthetized cats and human subjects for a comparative analysis of the dynamics of some indices during respiratory response to hypercapnic stimulus under various conditions. These indices are pulmonary ventilation, activity of diaphragmatic motoneurons and intercostal muscles, intrathoracic-

pressure drop, inspiratory occlusion pressure, and maximal rate of the initial increase in inspiratory pressure. It is shown that depending on the operating conditions of the respiratory system, each of the cited indices can reflect the efferent output of the respiratory center with inherent limitations S D

**A78-53791 #** Metabolic structure of the recovery process following various physical stresses (Metabolicheskaia struktura protsessy restitutsii posle fizicheskikh nagruzok razlichnogo kharaktera) N N Iakovlev, G V Aleksandrova, L S Batuner, A F Krasnova, R I Lenkova, S V Usik, and N R Chagovets (Ministerstvo Zdravookhraneniia SSR, Nauchno Issledovatel'skii Institut Meditsinskikh Problem Fizicheskoi Kul'tury, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, Aug 1978, p 1160-1173 18 refs In Russian

Results are presented for biochemical and mathematical analyses of the recovery process in white rats (180-220 g) subjected to various physical stresses (exercises). The results allow determination of the recovery phases and the dependence of the metabolic structure of recovery on the nature of the applied physical exercise. It is shown that the metabolic structure of recovery has common features during the rest period after nonfatiguing and rapid fatigue inducing stresses. However, this structure is abruptly changed after a stress causing slowly developing severe fatigue S D

**A78-53792 #** Use of the auricle-floor temperature of the rabbit as an index of skin blood flow (Ob ispol'zovanii temperatury ushnoi rakoviny krolika v kachestve pokazatelya kozhnogo krovotoka) B I Gekhman and N P Zakharzhevskaya (Akademiya Nauk SSSR, Institut Fiziologii, Leningrad, USSR) *Fiziologicheskii Zhurnal SSSR*, vol 64, Aug 1978, p 1177-1181 15 refs In Russian

**A78-53848** Biophysics of photosynthesis J Barber (Imperial College of Science and Technology, London, England) *Reports on Progress in Physics*, vol 41, Aug 1978, p 1157-1199 123 refs

A general review of the more physical aspects of photosynthesis is given. The subject is developed with reference to a time scale covering the various steps between photon capture and the appearance of the first stabilized chemical products. Details of the energy and electron transfer processes are considered and there is discussion of both the efficiency and mechanism for energy conversion (Author)

**A78-53865** Texture discrimination and Fourier analysis in human vision J E W Mayhew and J P Frisby (Sheffield, University, Sheffield, England) *Nature*, vol 275, Oct 5, 1978, p 438, 439 11 refs

It has been suggested that different cells in the visual cortex sensitive to different orientation/spatial frequency combinations, which are strongly believed to exist in man, decompose the retinal image into its two-dimensional Fourier components and that processes such as object recognition, region finding, and image segmentation then operate on this Fourier description. Experimental results are here reported on human texture discrimination which argue against this possibility by showing that textures which differ markedly in their Fourier spectrum are not always readily discriminable P T H

**A78-53873** Aminoacyl-tRNA synthetase families and their significance to the origin of the Genetic Code R Wetzol (Yale University, New Haven, Conn.) *Origins of Life*, vol 9, Sept 1978, p 39-50 34 refs Grant No NIH GM-22854

A correlation of various aspects of the protein structures and substrate and mechanistic specificities of the aminoacyl-tRNA synthetases has led to the identification of at least one family of enzymes probably derived from a common ancestral synthetase. While strong correlations exist in one part of the array of 64

codons comprising the Genetic Code, this itself may be interpreted as a meaningful pattern, most consistent with a development of the present code from earlier codes containing fewer amino acids and fewer available codons. Specifically, strong correlations in the enzymes whose cognate tRNAs respond to codons containing a central pyrimidine, including the enzyme family of Ile-, Phe-, Val-, Met-, and Leu-tRNA synthetases, suggests that these enzymes evolved last, and that, therefore, an earlier version of the Genetic Code was comprised solely of codons containing a central purine. It is suggested that further study of the historical interrelationships of these enzymes could lead to a fairly detailed picture of how the Genetic Code developed (Author)

**A78-53874 \*** Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation K L Shih and K A Souza (NASA, Ames Research Center, Extraterrestrial Biology Div., Moffett Field, Calif.) *Origins of Life*, vol 9, Sept 1978, p 51-63 16 refs

The effect of soil sterilization by dry heat (0.08% relative humidity), gamma radiation, or both on soil phosphatase, urease, and decarboxylase activity was studied. Soil sterilized by a long exposure to dry heat at relatively low temperatures (eight weeks at 100.5°C) retained higher activities than did soil exposed to a higher temperature (two weeks at 124.5°C), while all activity was destroyed by four days at 148.5°C. Sterilization with 7.5 Mrads destroyed less activity than did heat sterilization. The effect of several individually nonsterilizing doses of heat radiation is described M L

**A78-53875 \*** Chemical evolution and the origin of life - Bibliography supplement 1976 M W West, R A Koch (San Jose State University, San Jose, Calif.), and S Chang (NASA, Ames Research Center, Moffett Field, Calif.) *Origins of Life*, vol 9, Sept 1978, p 67-74 125 refs Grant No NCA2-0A675-707

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## STAR ENTRIES

**N78-32136#** Maryland Univ College Park Lab of Chemical Evolution

### LIFE BEYOND THE EARTH

Cyril Ponnamperna *In* Indian Inst of Sci Space Sci Technol and Appl An Overview Apr 1978 6 p Repr from Astronaut and Aeronaut Nov 1976 6 p

Avail NTIS HC A10/MF A01

The existence of life on other planets as compared to the evolution of life on earth is discussed. The discussion is high-lighted by historical references to life science theoreticians and the Viking landing on and sampling of the Martian soil. Emphasis is placed on the biochemical existence of life and laboratory experiments are cited in this area of life detection. G Y

**N78-32668#** National Aeronautics and Space Administration Washington D C

### ENDOGENOUS HISTAMINE AND PROMETHAZINE-INDUCED GASTRIC ULCERS IN THE GUINEA PIG

B Djahanguiri and M Hemmati Sep 1978 7 p refs Transl into ENGLISH from Therapie (France) v 25 1970 p 611-614 Transl by Kanner (Leo) Associates Redwood City Calif Original doc prep by Teheran Univ Iran (Contract NASw-3199)

(NASA-TM-75341) Avail NTIS HC A02/MF A01 CSCL 06C

Experiments performed with an inhibitor of diaminoxidase aminoguanidine and an inhibitor of histidine decarboxylase NSD 1055 showed that the frequency of gastric ulcers induced by promethazine was increased with the first inhibitor and decreased with the second. It is suggested that ulcers induced by promethazine in guinea pigs might be due to histamine-liberator effect of the antihistaminic compound. Author

**N78-32669#** National Aeronautics and Space Administration Washington D C

### THE EFFECT OF SEAWATER ON THERMOREGULATOR CENTERS

Spyr Dantas and Eug Phocas Aug 1978 10 p refs Transl into ENGLISH from Prakt Akad Athenon (Greece) v 14 26 Jan 1939 p 83-88 Transl by Kanner (Leo) Associates Redwood City Calif

(Contract NASw-3199)

(NASA-TM-75443) Avail NTIS HC A02/MF A01 CSCL 06C

Experiments were done on dogs to determine the mechanism of thermoregulation. Results show that natural seawater injected intravenously (150 200 and 300 cc) causes narcosis of the thermic centers and increases temperature. Diluted seawater injection causes an excitation of the thermic centers and an antipyretic effect. S B S

**N78-32670#** National Aeronautics and Space Administration Washington D C

### THE EFFECT OF VARIOUS DRUGS ON EXPERIMENTALLY INDUCED ULCERS IN IMMOBILIZED RATS

H Schramm Sep 1978 16 p refs Transl into ENGLISH from Deut Z Verdau-Stoffwechselkrankh (East Germany) v 28 no 5/6, 1968 p 305-312 Transl by Kanner (Leo) Associates Redwood City Calif Original doc prep by Friedrich-Schiller Univ Jena

(Contract NASw-3199)

(NASA-TM-75340) Avail NTIS HC A02/MF A01 CSCL 06C

Experiments related to the importance of functional disorders in the central nervous system in connection with stomach

diseases were performed on Wistar rats. Assuming that severe mental strains may be triggering factors for such disorders, testing of the effects of different drugs on experimentally induced ulcers in these rats was done. The immobilization method described by Bonfils was used. Particular importance was placed on the sex related difference which appeared. B B

**N78-32671#** Boeing Co Houston Tex

### RESEARCH AND DEVELOPMENT OF A LUMINOL-CARBON MONOXIDE FLOW SYSTEM Monthly Report, Apr - Jun 1977

Richard R Thomas Jun 1977 39 p refs

(Contract NAS5-22545)

(NASA-CR-156832 MR-7) Avail NTIS HC A03/MF A01 CSCL 06M

Adaption of the luminol-carbon monoxide injection system to a flowing type system is reported. Analysis of actual wastewater samples was carried out and revealed that bacteria can be associated with particles greater than 10 microns in size in samples such as mixed liquor. Research into the luminol reactive oxidation state indicates that oxidized iron porphyrins, cytochrome-c in particular, produce more luminol chemiluminescence than the reduced form. Correlation exists between the extent of porphyrin oxidation and relative chemiluminescence. In addition, the porphyrin nucleus is apparently destroyed under the current chemiluminescent reaction conditions. G G

**N78-32672#** Joint Publications Research Service, Arlington Va

### SPACE BIOLOGY AND AEROSPACE MEDICINE, NO 4

O G Gazenko ed 7 Sep 1978 138 p refs Transl into ENGLISH of Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 89 p

(JPRS-71830) Copyright Avail NTIS HC A07/MF A01

Physiological responses to space flight stress are presented along with selection criteria of cosmonauts.

**N78-32674#** Joint Publications Research Service Arlington Va

### INVESTIGATION OF POSSIBILITY OF USING LOWER BODY NEGATIVE PRESSURE TEST FOR SCREENING COSMONAUT CANDIDATES

Kh Kh Yarullin T N Krupina Yu M Svirzhev I V Benevolens kava T D Vasilyeva V I Asatryan and S L Kantor *In its* Space Biol and Aerospace Med No 4 (JPRS 71830) 7 Sep 1978 p 6-13 refs Transl into ENGLISH of Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 6-13

Avail NTIS HC A07/MF A01

The reaction of the cardiovascular system to lower body negative pressure was studied by observing vegetovascular distinctions in males engaged in mental activity. Wellbeing of the subjects and analysis of clinical and physiological examinations were used to assess the functional capabilities of the cardiovascular system and to predict orthostatic endurance. G G

**N78-32675#** Joint Publications Research Service Arlington Va

### KALURETIC RENAL FUNCTION IN MAN AS RELATED TO DIFFERENT DEGREES OF EXERCISE DURING BEDREST

L I Kakurin G S Arzamazov and A I Grigoryev *In its* Space Biol and Aerospace Med No 4 (JPRS 71830) 7 Sep 1978 p 14-20 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 13 17

Avail NTIS HC A07/MF A01

Uretic potassium chloride excretion functions of the human kidney were observed during prolonged bed rest and related to varying degrees of motor activity. Results show that substantial changes in potassium transport by the kidneys can be prevented by an optimum regime of exercise and adequate potassium intake with food. G G

**N78-32676#** Joint Publications Research Service, Arlington, Va  
**EVALUATION OF REGIONAL BLOOD FILLING BY MEANS OF RHEOPLETHYSMOGRAPHY COMBINED WITH FUNCTIONAL TESTS**  
 D G Maksimov and M V Domracheva *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 21-28  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4, Jul/Aug 1978 p 17-23

Avail NTIS HC A07/MF A01

Rheoplethysmography was used to determine the regional reactivity of vessels their reserve capacity and changes in regional blood filling as related to simulated space flight conditions. Obtained data are indicative of a correlation between changes in RPLG during functional tests and initial filling of the examined body regions  
 G G

**N78-32677#** Joint Publications Research Service, Arlington, Va  
**DYNAMICS OF FREE AMINO ACID LEVELS IN HUMAN BLOOD PLASMA DURING BED REST IN HEAD DOWN POSITION**  
 T F Vlasova, Ye B Miroshnikova and A S Ushakov *In its Space Biol and Aerospace Med*, No 4 (JPRS-71830) 7 Sep 1978 p 29-34  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 23-27

Avail NTIS HC A07/MF A01

Free amino acid assays of the human blood plasma at different stages of bed rest established a reliable increase during the course of 449-days of head down hypokinesia. Only the concentrations of proline, glycine and aspartic acid remained unchanged. Alanine and glutamic acid concentrations increased during bed rest and continued to increase during the recovery period. It is concluded that changes in human blood plasma aminograms reflect a change in protein metabolism  
 G G

**N78-32678#** Joint Publications Research Service, Arlington, Va  
**PSYCHOPHYSIOLOGICAL DISTINCTIONS OF PILOT PERFORMANCE DURING BRIEF EXPOSURE TO INTENSIVE PHOTIC STIMULI**  
 V F Zhernavkov, L N Karelina and Yu P Petrov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 35-39  
 ref Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 27-31

Avail NTIS HC A07/MF A01

Laboratory studies established that the time within which vision is restored after being blinded by a high powered light source depends on the intensity of the flash prior adaptation background and individual resistance to blinding. Repeated exposure to powerful photic stimuli not only had a less deleterious effect on control functions but diminished psychophysiological tension of the pilot  
 G G

**N78-32679#** Joint Publications Research Service, Arlington, Va  
**PHYSICAL FITNESS OF PERMANENT LOWLAND AND HIGHLAND RESIDENTS**  
 M T Turkmenov and Dzh I Imankulov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 40-45  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow), no 4 Jul/Aug 1978 p 31-35

Avail NTIS HC A07/MF A01

The same levels of hemodynamic pulmonary respiration and gas exchange were observed among permanent residents of lowlands and highlands of almost the same age and with the same physical development but vital capacity was smaller in highland residents. Maximum physical efficiency is greater among permanent residents of highlands (by over 16%), and it is implemented with less strain on the cardiovascular system but greater strain on the respiratory system as compared to lowland residents  
 Author

**N78-32680#** Joint Publications Research Service, Arlington, Va  
**METHODS OF IRRADIATING BIOLOGICAL OBJECTS AND RESULTS OF DOSIMETRY ONBOARD THE KOSMOS-690 SATELLITE**  
 Yu A Katov, I V Ignatov, A V Kolodin, R A Kuzin, V I Popov, L N Seliverstov, V G Semenov, M A Sychkov, and V V Yurgov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 46-52  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow), no 4, Jul/Aug 1978 p 35-41

Avail NTIS HC A07/MF A01

Radiophysical studies were used to establish experimental conditions for irradiation of animals and biological objects on Cosmos biosatellite. Thermoluminescent glasses were used to monitor irradiation conditions during inflight experiments. Radiation hazards were controlled at all stages of the flight experiment which provided about 700 rad per 24 hr exposure from a point source  
 G G

**N78-32681#** Joint Publications Research Service, Arlington, Va  
**HISTOCHEMICAL STUDY OF DIGESTIVE ORGANS OF RATS INVOLVED IN SPACE FLIGHT ON THE KOSMOS-690 SATELLITE**  
 M G Shubich, L L Goryacheva, V I Dudetskiy, N M Lutsenko, G M Mogilnaya and V G Vlasov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 53-58  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 41-46

Avail NTIS HC A07/MF A01

Morphohistochemical studies on rats after flight or ground based exposures to 220 rad respectively 600 and 955 rad were evaluated. Histochemical changes in the stomach and intestine of rats that had flown on a Cosmos biosatellite as well as those that were exposed to the combined effect of radiation and hypokinesia, are attributed to the development of a systemic adaptation syndrome to stress  
 G G

**N78-32682#** Joint Publications Research Service, Arlington, Va  
**INVESTIGATION OF THE INFLUENCE OF PROLONGED ROTATION ON RADIATION LESIONS**  
 Yu V Farber, L A Tabakova and A F Shafirkin *In its Space Biol and Aerospace Med*, No 4 (JPRS-71830) 7 Sep 1978  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow), no 4 Jul/Aug 1978 p 46-50

Avail NTIS HC A07/MF A01

Mice exposed to a combination of rotation and radiation showed an intensification of the repair process in the bone marrow and thymus after acute irradiation as manifested by a reduction in half time for restoration of lymphocytes in peripheral blood myelokaryocytes and weight of the gland  
 G G

**N78-32683#** Joint Publications Research Service, Arlington, Va  
**DISTINCTIONS OF RADIOPROTECTIVE EFFECT OF ACUTE HYPOXIA ON 5-DAY-OLD MICE PREADAPTED TO OXYGEN DEFICIENCY**  
 B Z Aytmagambetova, A L Vygodskaya, Yu V Korogodina, E P Petrosyan and S P Yarmonenko *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 65-71  
 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow), no 4 Jul/Aug 1978 p 50-54

Avail NTIS HC A07/MF A01

Irradiation experiments on mice demonstrated the radioprotective effects of acute hypoxia and initial oxygen status. The protective effect of hypoxia was much lower in cells cultivated in vivo and irradiated on the 10th to 12th day of tumor growth than in cells cultivated in vitro under normal oxygenation conditions. This decisive protective role of hypoxia is attributed to the intercellular oxygen concentration  
 G G



**N78-32684#** Joint Publications Research Service Arlington Va

**CHANGES IN ELECTROCEREBELLOGRAMS AND AUTONOMIC REACTIONS OF RATS TO ACCELERATIONS**

L D Klimovskaya and L S Ivanenko *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 72-78 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow), no 4 Jul/Aug 1978 p 55-59

Avail NTIS HC A07/MF A01

Changes in spontaneous bioelectric activity of the cerebellar cortex in relation to acceleration compensation reactions of the cardiovascular and respiratory systems were studied on rats. Results indicate that the interaction between the proprioceptive analyzer and the autonomic nervous system is an important element in the adaptation mechanism to gravity forces G G

**N78-32685#** Joint Publications Research Service Arlington Va

**ON THE POSSIBLE ROLE OF LYSOSOMAL PROTEINASES IN THE BIOLOGICAL EFFECTS OF ACCELERATIONS**

V N Totksky and N D Khaustova *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 79-84 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 60-64

Avail NTIS HC A07/MF A01

Acceleration effects on proteinase activity of liver cell lysosomes under normal conditions and after hydrocortisone injections were studied. Experiments on rats indicate that functional impairment of lysosomes is an early cellular reaction to acceleration stress and that hydrocortisone injection prevents onset of disturbances at the early stages after exposure to acceleration (20 min) G G

**N78-32686#** Joint Publications Research Service Arlington Va

**MORPHOLOGICAL STUDY OF HEMOPOIETIC ORGANS OF HYPOKINETIC RATS**

I A Rakova and V N Shvets *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 85-90 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4, Jul/Aug 1978 p 64-68

Avail NTIS HC A07/MF A01

A number of changes occur in the blood system of hypokinetic animals that are typical of the stress reaction: atrophy of the thymus and lymphatic system, lymphopenia, and neutrophilia. These changes are typical in the case of brief stress factors. However, in the presence of hypokinesia, an increase in number of lymphoid cells in bone marrow and discharge of mature granulocytes at the early stage of the reaction were not observed. In the case of a brief stress factor, the decrease in lymphoid cells occurs primarily in the thymus and only to a small extent in the spleen, whereas in the case of a chronic stress factor it occurs only in the thymus. In the presence of hypokinesia, the decrease in number of these cells is equally significant in the thymus and spleen. Thus, hypokinesia like other prolonged stimuli induces the greatest changes in lymphoid organs. The latter may be the cause of impairment of cellular and humoral immunity as well as resistance to infection in the organism submitted to prolonged hypokinesia. GRA

**N78-32687#** Joint Publications Research Service, Arlington, Va

**PROTECTIVE EFFECTS OF 2-AMINO BENZIMIDAZOLE DURING HYPERBARIC OXYGENATION, AND STATE OF CEREBRAL NITROGEN METABOLISM**

L G Mendzhentskaya, A A Krichvskaya and S A Lisovskaya *In its Space Biol and Aerospace Med*, No 4 (JPRS-71830) 7 Sep 1978 p 91-95 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4, Jul/Aug 1978 p 68-71

Avail NTIS HC A07/MF A01

Administration of 2-ABI prior to exposure to hyperoxia normalized amino acid metabolism in the brain of rats. Metabolic routes in reciprocal conversion of GABA, glutamic and aspartic acids specifically related to brain functions were maintained during hyperoxia of 3 and 6 atm G G

**N78-32688#** Joint Publications Research Service, Arlington, Va

**GOI ANOMALOSCOPES USED TO SET STANDARDS FOR COLOR VISION OF FLIGHT PERSONNEL**

V A Roslyakov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 96-97 ref Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 71-72

Avail NTIS HC A07/MF A01

A method is developed for setting color vision standards and for determining standards of color discrimination in relative units by representing the ration of reading magnitude to the mean reading level norm on anomaloscopes G G

**N78-32689#** Joint Publications Research Service Arlington Va

**EFFECTS OF WEIGHTLESSNESS AND HYPOKINESIA ON CONTRACTILITY OF BUNDLES OF GLYCERIN-TREATED RAT MUSCLE FIBERS**

M S Gayevskaya, I I Ivanov, N V Karsanov, N B Gabadze, V A Megaldadze, N P Mikhaleva and Ye A Nosova *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 98-101 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 72-74

Avail NTIS HC A07/MF A01

The effects of weightlessness and prolonged hypokinesia on contractile function of myofibrils of rat skeletal muscles were studied after the animals had been on a 22 day space flight or kept immobile for 50 days. The contractile properties of bundles of glycerin treated muscle fibers were used to determine onset of pathological disturbances directly in the protein complex of the myofibril system G G

**N78-32690#** Joint Publications Research Service Arlington Va

**DEVELOPMENT OF RADIATION LESIONS TO THE RAT HEART DURING A SPACE FLIGHT (EXPERIMENTAL MORPHOLOGICAL STUDY)**

A S Kaplanskiy and G N Durnova *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 102-105 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 74-76

Avail NTIS HC A07/MF A01

A severe decline in phosphorylase A and B activity and increase in beta-oxybutyrate dehydrogenase activity were found on the 12th day after irradiation in the myocardium of the absolute majority of rats in the flight group and animals in the ground-based model experiments, whereas some increase in activity of alpha glycerophosphate dehydrogenase not bound with NAD was demonstrated only in 50 percent of the rats examined. Histological changes in the myocardium were mostly the result of acute hypoxia which occurred when the animals were exsanguinated G G

**N78-32691#** Joint Publications Research Service Arlington Va

**EFFECTS OF ALTERED GRAVITY ON VISCOSITY OF CYTOPLASM AND PROTEIN CONTENT OF PLANT CELLS**

M G Tairbekov and A N Rozov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 106-113 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 76-77

Avail NTIS HC A07/MF A01

Physicochemical studies on geotropic reactions of corn cells to altered gravity and weightlessness conditions indicate a

nonuniform distribution of cell organelles in cytoplasm due to impaired circulation G G

**N78-32692#** Joint Publications Research Service Arlington Va

**ELECTROLYTE CONTENT OF THE MYOCARDIUM, SKELETAL MUSCLES AND BLOOD OF RATS DURING PROLONGED HYPOKINESIA AND READAPTATION**

N P Mikhaleva G D Yefimenko and I P Bobrovnikitskiy *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 114-116 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 80-81

Avail NTIS HC A07/MF A01

The distribution of potassium and sodium was studied in rat organs and tissues in the course of hypokinesia and the recovery period. The most marked changes were demonstrated in the potassium content of the tissues. It decreased in the myocardium and skeletal muscle and this was more marked and occurred at an earlier time than the decrease in potassium level in plasma and erythrocytes G G

**N78-32693#** Joint Publications Research Service Arlington Va

**REGIONAL REDISTRIBUTION OF BLOOD DURING THE IMMEDIATE AFTEREFFECT PERIOD FOLLOWING EXPOSURE OF RATS TO TRANSVERSE ACCELERATIONS**

O A Kovalev V N Grishanov S K Sheremetevskaya and O N Nepochatov *In its Space Biol and Aerospace Med*, No 4 (JPRS-71830) 7 Sep 1978 p 117-118 ref Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 82

Avail NTIS HC A07/MF A01

Radioactive tracer methods were used to demonstrate changes in relative and absolute blood content of rat organs, tissues and in different parts of the body. Quantitative processing of obtained data shows that transverse acceleration changed regional distribution circulation through passive mobilization of a small amount of blood from capacitance vessels of skeletal muscles of the abdomen and pelvis minor G G

**N78-32694#** Joint Publications Research Service Arlington Va

**EFFECT OF CORIOLIS ACCELERATIONS ON MAN'S ABILITY TO DETERMINE THE DIRECTION OF GRAVITATIONAL VERTICAL**

O A Vorobyev and A A Gyurozhian *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 119-123 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 83-85

Avail NTIS HC A07/MF A01

The link between degree of vestibulovegetative manifestations and the extent of deviation of the subjective vertical from the true one was studied with the subject's position constantly vertical in relation to the gravitation vector. Poorer results obtained with subjects that were more susceptible to motion sickness did not offer a correlation between resistance to motion sickness and capacity for spatial orientation G G

**N78-32695#** Joint Publications Research Service Arlington Va

**EFFECT OF THE COMBINATION OF DRY AIR HEAT AND COLD WATER TREATMENT ON HUMAN ORTHOSTATIC STABILITY**

V V Zhidkov V V Borschchenko and G A Manovtsev *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 124-128 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 85-87

Avail NTIS HC A07/MF A01

Hot and cold procedures consisting of 40-45 min of heat (65 plus or minus 3 C) followed by cold water rubs (20 plus or

minus 3 C) lead to some decline 40 min later in reaction of the circulatory system to the orthostatic test and two hours later to substantial improvement in endurance of orthostatic test G G

**N78-32696#** Joint Publications Research Service Arlington Va

**DYNAMICS OF AFFERENT IMPULSATION IN POSTERIOR SPINAL RADICES OF DOGS WITH RESTRICTED MOVEMENT**

S A Skuratova V S Oganov M A Shirvinskaya and V S Magedov *In its Space Biol and Aerospace Med* No 4 (JPRS-71830) 7 Sep 1978 p 129-132 refs Transl into ENGLISH from Kosmich Biol Aviakosmich Med (Moscow) no 4 Jul/Aug 1978 p 88-89

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A synchronization of bioelectrical activity of the posterior spinal radices was observed on the 30th day of limited mobility of dogs. Such a change in overall afferent impulsion under the influence of hypokinesia could be due to elimination of some proprioceptors (articular tendonal musculocutaneous) from activity as a result of substantial decrease in movements made by the animal. This is confirmed by a decline of overall motor activity at the end of the experiment G G

**N78-32697** Purdue Univ Lafayette Ind  
**AUDITORY FREQUENCY SELECTIVITY AND TWO-TONE SUPPRESSION IN NORMAL HEARING HUMAN LISTENERS**  
**Ph D Thesis**

Honor OMalley 1977 135 p

Avail Univ Microfilms Order No 7813097

A qualitative relationship between two-tone suppression and auditory frequency selectivity is presented. Threshold masking curves and two-tone masking patterns were collected under two conditions for the same normal hearing listeners using an adaptive two-alternative forced choice forward masking procedure. In the quiet condition the data were gathered in the presence of a noise floor. In the noise condition a narrowband noise masker centered one decade down from the probe was gated on with the tonal masker(s). The mutually-reflected changes in masking curves and in two-tone suppression as a consequence of the gated noise masker indicate a close relationship between frequency selectivity and suppression. The greater the magnitude of suppression above the center frequency of the masking curve the sharper the tuning of the masking curve. Dissert Abstr

**N78-32698** Columbia Univ Teachers Coll New York  
**THE RELATIONSHIP BETWEEN COMFORTABLE LOUDNESS RANGE AND MOST COMFORTABLE LOUDNESS FOR PURE TONES AND SPEECH IN SENSORINEURAL HEARING LOSS**  
**Ph.D Thesis**

Voldie Osmond McCarthy 1978 164 p

Avail Univ Microfilms Order No 7812012

Using Bekesy audiometry, comfortable loudness range (CLR) and most comfortable loudness (MCL) data for pure tones and speech were obtained for 60 male subjects with sensorineural hearing losses. Each subject performed six experimental tasks namely upper limit of comfortable loudness range (ULCLR), lower limit of comfortable loudness range (LLCLR) and MCL for speech and for pure tones. Means and standard deviations of CLR and MCL for pure tones and speech for the 60 subjects were determined and classified into two subgroups--mild and moderate to moderately severe. The results revealed that in general mean CLR for pure tones and speech tended to decrease as hearing loss becomes poorer. Also the sensation level of MCL for both stimuli is affected by the severity of hearing loss at threshold. Furthermore as hearing loss becomes poorer at threshold, MCL appears to get closer to LLCLR. Dissert Abstr

**N78-32699#** Civil Aeromedical Inst Oklahoma City Okla  
**THREE REPORTS RELEVANT TO STRESS IN AVIATION PERSONNEL**

E A Higgins M T Latcuga and C E Melton Feb 1978 36 p refs Sponsored by FAA

(AD-A051690 FAA-AM-78-5) Avail NTIS HC A03/MF A01 CSCL 06/5

Methods for simulating and monitoring aviation stress in air traffic controllers and pilots are evaluated. Areas included are cardiovascular and pulmonary parameters, altitude exposure, visual accommodation, blood drug level, internal body temperature, gastrointestinal pathology, and comparisons of previously studied controller subjects.

**N78-32700#** Civil Aeromedical Inst Oklahoma City Okla  
**DEVELOPMENT OF THE AVIATION STRESS PROTOCOL SIMULATION AND PERFORMANCE, PHYSIOLOGICAL, AND BIOCHEMICAL MONITORING SYSTEMS, PHASE 1**  
*In its* Three Rept Relevant to Stress in Aviation Personnel Feb 1978 16 p refs

Avail NTIS HC A03/MF A01 CSCL 06/5

Aviation personnel were exposed to various types of simulated physiological stress. The results were used in the development of the aviation stress protocol-simulation. Conclusions are given concerning the following: cardiovascular testing, time of exposure to altitude, internal body temperature, blood drug level, and blood glucose. S B S

**N78-32701#** Civil Aeromedical Inst Oklahoma City Okla  
**ASSESSMENT OF CARDIOVASCULAR FUNCTION AFTER EXPOSURE TO THE AVIATION STRESS PROTOCOL SIMULATION**

*In its* Three Rept Relevant to Stress in Aviation Personnel Feb 1978 9 p

Avail NTIS HC A03/MF A01 CSCL 06/5

Thirty-six air traffic controller subjects from previous stress studies were identified who subsequently suffered medical conditions severe enough to require waiver or retirement. These subjects' stress indices were compared with those of subjects who had no known pathology to see if any of the stress indicators were predictive of pathological conditions. High levels of steroid excretion are related to the presence or later development of gastrointestinal disease, the most common stress-related disease. The principal subcategories are related to ulceration of the stomach and duodenum. S E S

**N78-32702#** Civil Aeromedical Inst Oklahoma City Okla  
**THE RELATIONSHIP BETWEEN STRESS-RELATED METABOLITES AND DISQUALIFYING PATHOLOGY IN AIR TRAFFIC CONTROL PERSONNEL**

*In its* Three Rept Relevant to Stress in Aviation Personnel Feb 1978 9 p refs

Avail NTIS HC A03/MF A01 CSCL 06/5

Cardiovascular tests were administered immediately following the aviation stress protocol-simulation (ASPS) to identify any functional deterioration due to the ASPS exposure. These post-ASPS cardiovascular tests were assessed. A complete set of ASPS altitude exposures was achieved on a total of 10 normal male subjects. The results of the tests show: (1) statistically significant altitude-related displacements in physiological parameters and (2) the cardiovascular tests are to run parallel rather than in tandem with the core ASPS. S E S

**N78-32703\*#** National Aeronautics and Space Administration Washington D C

**THE EFFECT OF DIRECT HEATING AND COOLING OF HEAT REGULATION CENTERS ON BODY TEMPERATURE**

Henry Gray Barbour Sep 1978 33 p refs Transl into ENGLISH from Naunyn-Schmiedeberg's Arch Pharmacol Exp Pathol (West Germany) v 70 1912 p 1-26 Transl by Kanner (Leo) Associates Redwood City Calif Original doc prep by Vienna Univ (Contract NASw-3199)

(NASA-TM-75450) Avail NTIS HC A03/MF A01 CSCL 06P

Experiments were done on 28 rabbits in which puncture instruments were left in the brain for 1-2 days until the calor-puncture hyperthermia had passed and the body temperature was again normal. The instrument remaining in the brain was then used as a galvanic electrode and a second fever was produced, this time due to the electrical stimulus. It was

concluded that heat is a centrally acting antipyretic and that cold is a centrally acting stimulus which produces hyperpyrexia cold-induced fever. Author

**N78-32704\*#** National Aeronautics and Space Administration Washington D C

**THE CORRELATION OF SODIUM AND POTASSIUM METABOLISM WITH THE LEVEL OF ENERGY CONSUMPTION IN MAN DURING ADAPTATION TO HEAT**

B G Afanasyev and V A Zhestovskiy Jul 1978 13 p refs Transl into ENGLISH from Gigiena i Sanit (USSR) v 36 no 6 1971 p 32-37 Transl by Kanner (Leo) Associates Redwood City Calif Original doc prep by Dept of Naval Hygiene of the S M Kirov Military Medicine Academy Leningrad (NASA-TM-75331) Avail NTIS HC A02/MF A01 CSCL 06S

The sodium and potassium metabolism was studied in a thermal chamber at 35 deg and 80 percent relative humidity in 8 men for a period of 6 days. The control group (3 subjects) were outside of the chamber at a comfortable ambient temperature. The intracellular sodium and potassium metabolism were assessed based on their content in the erythrocytes. The finding was that during adaptation to heat a considerable amount of sodium was excreted by the body in the sweat and urine (about 1/3 of the sodium content of the human body) as compared with its intake and the amount of potassium retained in the body. Changes in the concentration of sodium and potassium may serve as indexes of the state of adaptation processes during constant exposure to heat. Author

**N78-32705#** Civil Aeromedical Inst Oklahoma City Okla  
**THREE-DIMENSIONAL ANTHROPOMETRY OF THE ADULT FACE**

J W Young and M S Pinski Mar 1978 40 p refs

(AD-A054938 FAA-AM-78-14) Avail NTIS HC A03/MF A01 CSCL 05/5

A new three-dimensional anatomical axis system is described that is based on four conventional anthropometrical face landmarks. Coincident as a coordinate (orthogonal) axis system, this reference system was developed to provide convenient orientation of the head segment and any surface landmark in three-dimensional space for direct comparisons with subject population. Forty-four anthropometric landmarks on the face and adjacent areas are defined and measured on 30 adult female and male test subjects participating in a study to evaluate protective breathing equipment. These data provide a basic data base for test subject selections, dimensional correlations of face types with equipment performance, and preliminary design criteria (gross structure dimensions) for dummy test devices and protective-type breathing equipment. Individual sets of data points for each subject are presented in tabular format for the convenience of data use. G G

**N78-32706#** Civil Aeromedical Inst Oklahoma City Okla  
**THE EFFECTS OF ALTITUDE AND TWO DECONGESTANT-ANTIHISTAMINE PREPARATIONS ON PHYSIOLOGICAL FUNCTIONS AND PERFORMANCE**

E A Higgins W D Chiles J M McKenzie A E Jennimus G E Funkhouser and S R Mullen Apr 1978 15 p refs (AD-A054793 FAA-AM-78 19) Avail NTIS HC A02/MF A01 CSCL 06/15

Fourteen men were studied to determine the combined effects of two altitudes (ground level (1,274 ft) and (12,500 ft)) and three preparations (lactose placebo, Compound A (Actifed) and Compound B (Dristan)). Physiological data show that A was a stimulant and B a depressant. Subjects reported least subjective attentiveness with A and greatest with lactose. Significant time effects were evident in subjective ratings (increasing fatigue and decreasing energy interest and attentiveness). The Multiple Task Performance Battery (MTPB) showed no effects of altitude, drugs, or time on overall performance, however, performance declined from the first to the second hour in several tasks while problem solving improved. The data are compatible with reported decreasing interest and attentiveness. Results from physiological parameters and some subjective evaluations indicate that time after ingestion and type of compound ingested are important. G G

**N78-32707#** Civil Aeromedical Inst Oklahoma City, Okla  
**CARDIORESPIRATORY ASSESSMENT OF DECONGESTANT-ANTIHISTAMINE EFFECTS ON ALTITUDE, +Gz, AND FATIGUE TOLERANCES**

Michael T Lategola, Audie W Davis Jr Peggy J Lyne and Mary J Burr Apr 1978 26 p refs  
 (AD-A055089 FAA-AM-78-20) Avail NTIS  
 HC A03/MF A01 CSCL 06/15

Decongestants and antihistamines are known to produce effects capable of adversely modifying physiological function and psychomotor task performance. Because of relevance to safe pilot performance, the effects of single doses of two decongestant-antihistamine preparations (Compound A and Compound B), or a placebo on cardiorespiratory responses to two equally spaced +2Gz tests during separate 2-hour exposures at ground level (GL) (1,274 ft MSL) and 12,500 ft chamber altitude were assessed. Postaltitude fatigue was assessed by cardiorespiratory responses to submaximal bicycle ergometry. Compound A and Compound B appeared to exert no significant detrimental effects on short-duration postaltitude ergometric fatigability. All combinations of medication, altitude, and +Gz were well tolerated. G G

**N78-32703#** Civil Aeromedical Inst Oklahoma City, Okla  
**AEROMEDICAL IMPLICATIONS OF THE X-CHROM LENS FOR IMPROVING COLOR VISION DEFICIENCIES**

Kenneth W Welsh, John A Vaughan, and Paul G Rasmussen Apr 1978 23 p refs

(AD-A054794 FAA-AM-78-22) Avail NTIS  
 HC A02/MF A01 CSCL 06/12

The X-Chrom contact lens is a recent device recommended to improve defective color vision. The red lens is usually worn on the nondominant eye and may require extended wearing for optimum color vision enhancement. A battery of tests was given to 24 individuals: 12 with normal and 12 with defective color vision. While wearing X-Chrom lenses, subjects had significantly improved scores on standard clinical pseudoisochromatic plate tests including the Hardy-Rand-Rittler, Ishihara, and Dvorine plates. Data indicated that color identification scores using the Farnsworth Lantern, Color Threshold Tester, and the Aviation Signal Light Gun were not significantly different for evaluations made with and without the X-Chrom lens. Minimal changes were found on several tests including the Farnsworth D-15, aeronautical chart color identification task, Holmgren Yarn visual acuity, phorias, and stereoscopic depth perception. The majority of control and experimental subjects noted a change in the perceived path of the swinging pendulum while viewing through a monocular red filter or an X-Chrom lens, respectively. G G

**N78-32703#** Franklin Inst Research Labs Philadelphia, Pa  
 Dept of Science Information Services

**A LITERATURE REVIEW PROBLEM DEFINITION STUDIES ON SELECTED TOXIC CHEMICALS VOLUME 4. OCCUPATIONAL HEALTH AND SAFETY ASPECTS OF THE FOG OILS SGF NO 1 AND SGF NO 2 AND SMOKE SCREENS GENERATED FROM THEM** Final Report, Mar 1977 - Apr 1978

Deborah Liss-Suter, Jon E Villaume, and Paul N Craig Apr 1978 162 p refs

(Contract DAMB17-77-C-7020 DA Proj 3E7-62720-A-835) (AD-A055903) Avail NTIS HC A08/MF A01 CSCL 06/20

Literature is reviewed (144 references) on the following subjects: physico-chemical properties; generation of fog oil smoke; human toxicity; occupational hazards and associated health and safety practices and standards; toxicological investigations in animals including mice, rats, guinea pigs, hamsters, monkeys, rabbits, dogs, cats, and calves; absorption, distribution, metabolism and excretion in mammals; methods of sampling and determining atmospheric fog oil smoke, and extraction and determination of oils in biologic media. The two fog oils, SGF No 1 and SGF No 2, are both refined petroleum products. SGF No 1 is representative of fuels (similar to fuel oils No 1 and No 2 and light grades of diesel fuel), while SGF No 2 is a lubricating oil (related to light automotive and industrial lubricating oils and mineral oils). The two fog oils have different viscosities, distillation ranges, flash points, and different hydrocarbon compositions among others. Both oils are used in smoke

generators which vaporize the oils and force the vapors into the atmosphere where they condense into a dense white smoke screen consisting of oil microdroplets. Effects of continuous exposure of U.S. Army personnel to fog oil smoke screens, for weeks on end, have not been documented. GRA

**N78-32710#** Science Applications, Inc. Arlington, Va  
**BIOCYBERNETICS EXPERIMENT. COMMAND AND CONTROL HUMAN FACTORS EXPERIMENTAL PROGRAM** Final Report, Oct 1976 - Sep 1977

T Bevan 19 Jan 1978 58 p  
 (Contracts N00014-77-C-0107, MDA903-77-C-0119) (AD-A055666, SAI-78-727-WA) Avail NTIS  
 HC A04/MF A01 CSCL 05/8

On the basis of on-site job analyses conducted at several national military C3 centers, message sorting was identified as both a highly critical center function and as a man-machine task amenable to future online biocybernetic applications. Consequently, the experiment reported here simulated a computer-assisted message handling task and was designed to manipulate the difficulty of that task in order to identify EEG correlates of low, medium, and high task difficulty. Author (GRA)

**N78-32711#** National Technical Information Service, Springfield, Va

**ALTITUDE HYPOXIA. A BIBLIOGRAPHY WITH ABSTRACTS** Progress Report, 1924 - May 1978

Elizabeth A Harrison May 1978 254 p. Supersedes NTIS/PS-77/0446, NTIS/PS-76/0378 and NTIS/PS-75/237

(NTIS/PS-78/0443, NTIS/PS-77/0446, NTIS/PS-76/0378, NTIS/PS-75/237) Avail NTIS HC \$28.00/MF \$28.00 CSCL 06S

The selected abstracts of research reports cover stress physiology, narcosis, acceleration tolerance, adaptation (physiology), psychophysiology, respiration, metabolism, and cardiovascular system as applied to altitude hypoxia. (This updated bibliography contains 247 abstracts, 11 of which are new entries to the previous edition.) GRA

**N78-32712#** National Technical Information Service, Springfield, Va

**TOXICITY OF GASEOUS HALOGENATED ORGANIC COMPOUNDS. A BIBLIOGRAPHY WITH ABSTRACTS** Final Report, 1924 - Jun 1978

Pernell W Crockett Jun 1978 298 p. Supersedes NTIS/PS-77/0521, NTIS/PS-76/0132, NTIS/PS-75/387, COM-73-11881 (NTIS/PS-78/0600/3, NTIS/PS-77/0521, NTIS/PS-76/0132, NTIS/PS-75/387, COM-73-11881) Avail NTIS  
 HC \$28.00/MF \$28.00 CSCL 06T

Subject areas including toxicological studies on halogenated hydrocarbons used as industrial chemicals, fire extinguishers, anesthetics, solvents, pesticides, and aerosol propellants are presented. (This updated bibliography contains 292 abstracts, 114 of which are new entries to the previous edition.) Author

**N78-32713#** Auerbach Associates, Inc. Philadelphia, Pa  
**ACRYLONITRILE** Final Monograph

Jerome T Maddock, Wendy L Byer, Roger T Malseed, John Keresztesy, Thomas J Taylor, and Arthur Katz 17 Dec 1977 110 p refs

(Contract CPSC-C-76-0067) (PB-280478/9, AAI-2383/2384-700-TR-3) Avail NTIS  
 HC A06/MF A01 CSCL 06T

The literature regarding acrylonitrile was reviewed and attempts were made to determine the potential risk associated with the exposure of the U.S. consumer to products prepared from acrylonitrile. Acrylonitrile was rated very toxic, although its toxic mechanism remains in dispute. Evidence indicates its possible carcinogenicity in occupationally exposed populations. However, consumer exposure to the acrylonitrile monomer is extremely rare, occurring at present only in textile fibers manufactured in such a way as to provide no exposure to the consumer. GRA

**N78-32714#** Mitre Corp, McLean, Va  
**Mitre Div AIR POLLUTION ASSESSMENT OF VINYLIDENE CHLORIDE** Final Report

J Hushon and M Kornreich Apr 1978 82 p  
(Contract EPA-68-02-1495)  
(PB-280624/8 MTR-7230) Avail NTIS HC A05/MF A01  
CSCL 06T

Chronic exposure to low levels of vinylidene chloride can result in liver and kidney damage. Vinylidene chloride is a central nervous system depressant reported to have a narcotic effect. Mutagenicity of vinylidene chloride in micro-organisms indicates a need for investigation of its carcinogenicity. The population at risk due to vinylidene chloride exposure is composed primarily of workers in industrial or commercial operations manufacturing or using it. Airborne emissions of vinylidene chloride are not likely to pose a significant risk to the general population. Emissions during production, storage, and transport can be controlled by methods similar to those planned for control of vinyl chloride.

GRA

**N78-32715#** Environmental Research Lab, Narragansett, RI  
**ANNOTATED BIBLIOGRAPHY ON BIOLOGICAL EFFECTS OF METALS IN AQUATIC ENVIRONMENTS, 3D**

Ronald Eisler, Daniel J. O'Neill, Jr., and Glen W. Thompson Jan 1978 496 p refs  
(PB-280953/1 EPA-600/3-78-005 NO-1293-2246) Avail  
NTIS HC A21/MF A01 CSCL 06T

Titles of 954 technical articles are listed on the subject of toxicological, physiological, and metabolic effects of stable and radio-labelled chemical species of metal cations to marine, estuarine, and freshwater flora and fauna. Each reference was annotated and subsequently indexed by metal, by taxa, and by author in cumulative indices which encompass this volume and the initial volumes in this series.

GRA

**N78-32716#** Civil Aeromedical Inst., Oklahoma City, Okla.  
**EXPERIMENTAL ATTEMPTS TO EVOKE A DIFFERENTIAL RESPONSE TO DIFFERENT STRESSORS**

C. E. Melton, J. M. McKenzie, J. T. Saldivar, and S. M. Wicks Apr 1978 7 p refs  
(AD-A054795 FAA-AM-78-18) Avail NTIS  
HC A02/MF A01 CSCL 06/16

Ten paid male subjects each worked at a physical task with no competitive element (treadmill) and a competitive task (Pong) with minimal physical activity. There were three work periods, each 50 min long. Ten minutes were allowed for rest and urine collection after each work period. The experimental period lasted 3 hr. Urine was analyzed for 17 ketogenic steroids (17-KGS), epinephrine (E), and norepinephrine (NE). Heart rates were derived from ambulatory electrocardiograms. There were no statistically significant differences in excretion of urinary metabolites during corresponding episodes of the two tasks. Heart rates were significantly higher during treadmill work than during Pong playing. Rest-to-work differences in excretion of 17 KGS and NE are not significant. The rest-to-work increase in heart rate is significant for treadmill but not for Pong. The increase in epinephrine excretion strengthens the conclusion drawn from field experiments that this measurement is the best indicator of the intensity of air traffic control work per se.

Author

**N78-32717\*#** National Aeronautics and Space Administration  
Langley Research Center, Hampton, Va.  
**EFFECT OF VIBRATION DURATION ON HUMAN DISCOMFORT**

Sherman A. Clevenson, Thomas K. Dempsey, and Jack D. Leatherwood Sep 1978 26 p refs  
(NASA-TP-1283 L-12248) Avail NTIS HC A03/MF A01  
CSCL 05H

The duration effects of random vertical vibration on passenger discomfort were studied in a simulated section of an aircraft cabin configured to seat six persons in tourist-class style. Variables of the study included time of exposure (0.25 min to 60 min) and the rms amplitude of vibration (0.025g to 0.100g). The vibrations had a white noise spectrum with a bandwidth of 10 Hz centered at 5 Hz. Data indicate that the discomfort threshold occurred at an rms vertical acceleration level of 0.027g for all durations of vibration. However, for acceleration levels that exceeded the discomfort threshold, a systematic decrease in discomfort occurred as a function of increasing duration of

vibration. For the range of accelerations used, the magnitude of the discomfort decrement was shown to be independent of acceleration level. The results suggest that discomfort from vertical vibration applied in the frequency range at which humans are most sensitive decreases with longer exposure, which is the opposite of the recommendation of the International Standard ISO 2631-1974 (E) Guide for the Evaluation of Human Exposure to Whole-Body Vibration.

A. R. H.

**N78-32718#** Air Force Human Resources Lab, Brooks AFB, Tex.

**AREA OF INTEREST/FIELD-OF-VIEW RESEARCH USING ASPT Interim Report, Oct 1976 - Dec 1977**

W. Dean LeMaster and Thomas M. Longridge, Jr. May 1978 22 p refs  
(AD-A055692 AFHRL-TR-78-11) Avail NTIS  
HC A02/MF A01 CSCL 01/4

Two exploratory experiments were conducted in the Advanced Simulator for Pilot Training to examine the head-slaved area of interest (AOI) approach for reduced fields-of-view employing computer-generated imagery (CGI). The objective of Study 1 was to establish a suitable range of AOI sizes for simulated conventional gunnery range bombing performance. The results indicated an AOI size as small as 70 vertical x 90 deg horizontal could be usefully employed without seriously degrading bombing performance. The objective of Study 2 was to determine the effect of AOI level of detail on air-to-surface weapon delivery performance in a tactical environment. Study 2 also addressed the question of whether AOI size affected bombing performance in such an environment. No effects on bombing performance of either detail level, AOI size, or their interaction were observed. It was concluded from both studies that an AOI size as small as 70 x 90 is feasible for the head-slaved AOI approach. Further research on required detail level is needed. Author (GRA).

**N78-32719#** Civil Service Commission, Washington, D.C.  
Personnel Research and Development Center

**STABILITY OF CHARACTERISTICS OF ALTERNATE FORMS OF A TEST BATTERY Final Report**

Hilda Wing Aug 1977 12 p  
(PB-280958/0 TM-77-7) Avail NTIS HC A02/MF A01 CSCL 05J

The stability of a test battery across different test forms and different test-taker groups was investigated. The characteristics scrutinized were the reliabilities of the components of the battery, their intercorrelations, and the reliabilities of the composite total scores. The reliabilities, both of the subtests and the composites, were stable as were all but one group of intercorrelations. An explanation for this exception is not readily available.

GRA

**N78-32720\*** National Aeronautics and Space Administration  
Lyndon B. Johnson Space Center, Houston, Tex.

**CONDITION SENSOR SYSTEM AND METHOD Patent**

John T. Polhemus, Joseph E. Morgan, and Arthur Mandell inventors (to NASA). Issued 30 May 1978. 6 p. Filed 21 May 1976. Supersedes N76-26448 (14-17 p 2189).  
(NASA-Case-MSC-14805-1 US-Patent-4 092 633)  
US-Patent-Appl-SN-688856, US-Patent-Class-340-213R  
US-Patent-Class-340-262 US-Patent-Class-340-279,  
US-Patent-Class-340-285 US-Patent-Class-340-309 1) Avail  
US Patent Office CSCL 05H

The condition sensor system comprises a condition detector which produces a pulse when a parameter of the monitored condition exceeds a desired threshold. A resettable condition counter counts each pulse. A resettable timer is preset to produce a particular time frame. The counter produces a condition signal when the accumulated number of pulses within the time frame is equal to or greater than a preset count. Control means responsive to the incoming pulses and to the condition signal produce control signals that control utilization devices. After a suitable delay, the last detected pulse simultaneously resets the pulse counter and the timer and prepares them for sensing another condition occurrence within the time frame. The invention has particular

utility in the process of detecting rocking motions of blind people  
A controlled audible bio-feedback signal is provided which  
constitutes a warning to the blind person that he is rocking  
Official Gazette of the U S Patent Office

**N78-32721\*** National Aeronautics and Space Administration  
Washington D C  
**COOLING SYSTEM FOR REMOVING METABOLIC HEAT  
FROM AN HERMETICALLY SEALED SPACESUIT** Patent  
Bruce W Webbon Hubert C Vykukal, and Bill A Williams  
inventors (to NASA) Issued 20 Jul 1978 8 p Filed 23 Dec  
1976 Supersedes N77-14743 (15 - 05 p 0661)  
(NASA-Case-ARC-11059-1 US-Patent-4 095,593  
US-Patent-Appl-SN-753978, US-Patent-Class-128-142 7  
US-Patent-Class-62-259) Avail US Patent Office CSCL 06Q  
An improved cooling and ventilating system is described for  
removing metabolic heat waste gases and water vapor generated  
by a wearer of an hermetically sealed spacesuit The cooling  
system was characterized by a body suit having a first circuit  
for simultaneously establishing a cooling flow of water through  
the thorax and head sections of the body suit Circulation patches  
were included mounted in the thorax section and head section  
of the body suit A second circuit for discharging a flow of gas  
throughout the spacesuit and a disconnect unit for coupling the  
circuits with a life support system externally related to the  
spacesuit were provided

Official Gazette of the U S Patent Office

**N78-32722#** Civil Aeromedical Inst, Oklahoma City Okla  
**THE RELATIONSHIP OF PREDEVELOPMENTAL 150  
TRAINING WITH NONCOMPETITIVELY SELECTED AIR  
TRAFFIC CONTROL TRAINEES TO FAA ACADEMY  
SUCCESS**  
James O Boone Mar 1978 25 p refs  
(AD-A055009 FAA-AM-78-10) Avail NTIS  
HC A02/MF A01 CSCL 05/9

Past studies have demonstrated that women and minorities  
are less likely to be selected as FAA air traffic controllers than  
are nonminority men and when selected are less likely to be  
successful One major reason for this is that women and minorities  
have less aviation-related background experience The predevelop-  
mental program was begun to give those selected for the program a  
1 year orientation to aviation and air traffic control prior to  
FAA Academy training The unique relationship between  
predevelopmental training and Academy success was studied  
An overview of the relationships between various background  
characteristics, selection measures predevelopmental training  
measures and Academy measures was first computed Then  
through path analysis the significant relationships were considered  
simultaneously to determine the unique relationship between  
predevelopmental training and Academy success The path models  
indicated that predevelopmental training overall does enhance a  
trainee's potential for Academy success with a possible differential  
effect according to minority status G G

**N78-32723#** Department of Transport and Civil Aviation  
Melbourne (Australia) Aviation Medicine Branch  
**PULL FORCE CAPABILITIES FOR PARACHUTE RIPCORDER  
RELEASE**  
Margaret I Bullock (Queensland Univ Brisbane Australia) Nov  
1977 52 p refs  
(Memo-33) Avail NTIS HC A04/MF A01

The pull force capabilities of female parachutists in positions  
relevant to ripcord release were assessed Pull forces which can  
be exerted for period of 0.25 1 1.5 2 and 2.5 seconds during  
a 5 second pull are presented in percentile form The relatively  
low level of strength exhibited by the weakest groups of the  
population emphasizes the need for such basic information in  
equipment design G G

**N78-32724\*#** National Aeronautics and Space Administration  
Marshall Space Flight Center Huntsville Ala  
**PNEUMATIC INFLATABLE END EFFECTOR** Pat-  
ent Application  
Keith H Clark and James D Johnston inventors (to NASA)  
22 Sep 1978 11 p

(NASA-Case-MFS-23696-1 US-Patent-Appl-SN-945044) Avail  
NTIS HC A02/MF A01 CSCL 05H

An invention is presented which relates to an end effector  
for use on the end of a remotely controlled manipulator arm of  
a robot or teleoperator device The end effector grasps an object  
by being inflated after insertion into an open area of the object  
Novelty of the invention is believed to reside in the use of a  
balloon-type inflatable end member for a remote manipulator  
and in the spline and reinforced sections of the balloon NASA

**N78-32725#** Los Alamos Scientific Lab N Mex  
**RESPIRATOR SELECTION**  
Darrel D Douglas 1978 14 p refs Presented at Can Conf  
on Personal Protect Equipment, Toronto 23 Jan 1978  
(Contract W-7405-eng-36)  
(LA-UR-78-119, Conf-780115-1) Avail NTIS  
HC A02/MF A01

Some basic guidelines in respirator selection are given to  
assist those who must set up a respirator program Guidelines  
for respirator selection are contained in the OSHA/NIOSH  
respirator decision logic a document intended for OSHA/NIOSH  
use in determining respirator requirements for regulations The  
guidelines given here are meant for use by those who must  
prescribe respiratory protection and do not have specific  
regulations for guidance For this purpose many of the guide-  
lines in the OSHA/NIOSH decision logic will be used After  
consideration of the basic information necessary for selection  
the use of respirator selection tables is discussed ERA

**N78-33018#** Joint Publications Research Service, Arlington,  
Va  
**FIFTY MINUTE IN HYDRAULIC WEIGHTLESSNESS**  
A Khorobrykh *In its* Transl on USSR Sci and Technol Phys  
Sci and Technol, No 42 (JPRS-71612) 3 Aug 1978 p 54-60  
Transl into ENGLISH from Aviat Kosmonavt (Moscow), no 6,  
1978 p 36-37  
Copyright Avail NTIS HC A05/MF A01

A description is given of astronaut weightlessness training  
in an USSR hydraulic laboratory It is explained that the  
laboratory is also used to perform studies and experiments to  
develop and improve methods of executing many of the operations  
in orbit both inside and outside the station LS

**N78-33033#** Joint Publications Research Service Arlington  
Va  
**POLISH COSMONAUT SELECTION PROCESS DESCRIBED**  
Stanislaw Remuszko *In its* Transl on USSR Sci and Technol  
Phys Sci and Technol No 45 (JPRS-71673) 14 Aug 1978  
p 24-26 Transl into ENGLISH from Slowo Powszechnie (Warsaw)  
28 Jun 1978 p 3

Avail NTIS HC A04/MF A01

An interview with Col Dr Romuald Bloszczyński of the  
Military Institute of Aviation Medicine concerning the Polish  
cosmonaut selection process is presented Areas of discussion  
include the criteria for selecting cosmonaut candidates and  
psychophysical characteristics they must possess BB

**N78-33034#** Joint Publications Research Service, Arlington  
Va  
**DEVELOPMENT OF MODERN SPACESUITS**  
G Ilin V Ivanov, and I Pavlov *In its* Transl on USSR Sci  
and Technol Phys Sci and Technol No 45 (JPRS-71673)  
14 Aug 1978 p 27-38 Transl into ENGLISH from Nauka  
Zhizn (Moscow) no 6 1978 p 40-46

Copyright Avail NTIS HC A04/MF A01

The development and successful performance of the space  
flight suit as an important life support system is reviewed BB



**N78-33701** George Washington Univ., Washington, D C  
**THE EFFECTS OF SUPRANORMAL CONCENTRATIONS OF POTASSIUM ION AND OTHER VASOACTIVE DRUGS ON THE VISUAL EVOKED RESPONSE AND REGIONAL CEREBRAL BLOOD FLOW IN THE MONKEY BRAIN**  
 Ph.D. Thesis

Billy Gray Bass 1978 150 p  
 Avail Univ Microfilms Order No 7816549

Common cortical electrodes were used for the measurement of regional cerebral blood flow (rCBF), visual evoked response (VER) and electrocorticogram (EEG) in the occipital cortex of the monkey (*Macaca fascicularis*). High potassium ion concentration Ringers lactate histamine norepinephrine and serotonin were perfused at the electrode sites to stimulate changes in rCBF and VER. Significant increases in rCBF and significant reductions in VER amplitude were observed for perfusions of 15 mEq/l and 40 mEq/l concentrations of potassium. Histamine demonstrated both direct and indirect effects on rCBF and VER. Serotonin topically applied had no effect on rCBF but reduced VER at 500 micromol concentration. Norepinephrine, topically applied at up to 1 mM concentration had effects similar to those of histamine on rCBF and VER. Dissert Abstr

**N78-33702\*** Boeing Co Huntsville Ala  
**BIOLOGICAL WATER QUALITY MONITORING USING CHEMILUMINESCENT AND BIOLUMINESCENT TECHNIQUES** Final Report

Richard R Thomas 10 Feb 1978 23 p  
 (Contract NAS5-22545)  
 (NASA-CR-156830) Avail NTIS HC A02/MF A01 CSCL 06M

Automated chemiluminescence and bioluminescence sensors were developed for the continuous monitoring of microbial levels in water supplies. The optimal chemical procedures were determined for the chemiluminescence system to achieve maximum sensitivity. By using hydrogen peroxide reaction rate differentiation ethylene diamine tetraacetic acid (EDTA) and carbon monoxide pretreatments factors which cause interference were eliminated and specificity of the reaction for living and dead bacteria was greatly increased. By employing existing technology with some modifications a sensitive and specific bioluminescent system was developed. G G

**N78-33703\*** National Aeronautics and Space Administration  
 Washington D C

**RELATIONSHIP BETWEEN OSMOTIC PRESSURE OF THE BLOOD AND SECRETION OF SWEAT**

A Montuori Oct 1978 21 p refs Transl into ENGLISH from Arch Fisiol (Italy), v 9 no 4 1904 p 439-452 Transl by Kanner (Leo) Associates Redwood City Calif Original doc prep by Inst of Biol Sci Naples  
 (Contract NASw-3199)  
 (NASA-TM-75461) Avail NTIS HC A02/MF A01 CSCL 06C

Experiments with cats show that the thermic secretion of sweat represents a specific case of a general law. The central nervous apparatus that controls the secretion of sweat begins to function when the osmotic pressure of the blood drops below normal. Author

**N78-33704\*** Rochester Univ N Y Dept of Radiation Biology and Biophysics

**X-RAY ANALYSIS OF BIOLOGICAL SPECIMENS**

James R Coleman 1978 15 p refs Presented at the Scanning Electron Microscopy Conf Los Angeles 16 Apr 1978  
 (Contract EY-76-C-02-3490)  
 (UR-3490-1341 Conf-780415-2) Avail NTIS HC A02/MF A01

Electron probe X-ray microanalysis of biological samples involves samples with properties quite different from those usually encountered with geological and metallurgical materials specimens. In order to optimize conditions for analyzing biological samples it is necessary to take into account the ways in which the biological materials interact with the electron beam and the X-rays generated by the electron beam. Range of electron

penetration beam spreading X-ray induced X-ray fluorescence beam current accelerating voltage and electron source brightness influence analysis and the effects of these parameters are examined. The physical density of the sample its surface characteristics and mean atomic number also affect analysis and the role of these parameters in analysis are outlined. Types of quantitative analysis are described and appropriate quantitative procedures for each type are presented and analyzed. ERA

**N78-33706\*** Massachusetts Inst of Tech Oak Ridge Tenn School of Chemical Engineering Practice  
**VOLUME-RESTRICTED FREEZING OF LIVING CELLS AND TISSUES**

S D Engstrom Y E Chu W F Sung and M S Giroux 20 Dec 1977 28 p refs  
 (Contract W-7405-eng-26)  
 (ORNL/MIT-265) Avail NTIS HC A03/MF A01

The effect of constant-volume freezing on the survival of red blood cells in diluted rabbit blood and of *Artemia Salina* (brine shrimp) in dimethyl sulfoxide (DMSO)-saline solution was examined. Constant-volume freezing significantly improved red-blood-cell survival but not brine-shrimp survival compared with constant-pressure freezing. Cell survival could be further increased by using high surface-area-to-volume vessels moderate cooling rates and fast warming rates. Unfrozen *Artemia* survived for more than 2.5 hr at room temperature in a solution which maintained constant volume during freezing (32.5 vol percent DMSO). Since *Artemia* also withstood pressures above 10,000 psi and formation of exterior ice deaths were attributed to the freezing or thawing processes particularly to the formation of ice within the organisms. ERA

**N78-33706\*** Battelle Pacific Northwest Labs Richland Wash  
**BIOLOGICAL EFFECTS OF HIGH STRENGTH ELECTRIC FIELDS ON SMALL LABORATORY ANIMALS** Annual Report, Apr 1977 - Mar 1978

Apr 1978 213 p  
 (Contract EY-76-C-06-1830)  
 (HCP/T1830-03) Avail NTIS HC A10/MF A01

The biological effects on mice and rats of exposure to 60-Hz electric fields were studied. Results are reported on the effects of 30-day and 60-day exposures to 100 kV/m 60-Hz electric fields on hematologic values blood chemistry and organ weights. With the possible exception of elevated blood platelet counts following 60-day exposures there were no pathological changes observed in either mice or rats. ERA

**N78-33707\*** National Technical Information Service Springfield Va

**CRYOBIOLOGY A BIBLIOGRAPHY WITH ABSTRACTS** Progress Report, 1964 - Jun 1978

Jul 1978 166 p Supersedes NTIS/PS-77/0619 NTIS/PS-76/05-57 NTIS/PS-75/508  
 (NTIS/PS-78/0678/9 NTIS/PS-77/0619 NTIS/PS-76/0557 NTIS/PS-75/508) Avail NTIS HC \$28.00/MF \$28.00 CSCL 06C

Cryogenic blood preservation cryogenic surgical transplantation cryopreservatives, cryoprotective agents cryosurgery and cryotherapy are the subjects covered by the selected abstracts of research reports. (This updated bibliography contains 160 abstracts, 14 of which are new entries to the previous edition.) GRA

**N78-33708** Michigan Univ Ann Arbor  
**QUANTITATIVE ORGAN VISUALIZATION** Ph D Thesis

Louis Theodore Kircos 1978 146 p  
 Avail Univ Microfilms Order No 78-13683

The use of single photon emission computed tomography (ECT) to perform QOV was evaluated using a scintillation camera transaxial tomograph. The extent of the radioactivity distribution of the organ of interest was defined by the extent of and the edges of the organ of interest were delineated by computing the maximum of the least squares directionally sensitive first derivative of the image. Also an expression for the absolute activity in the organ was derived in terms of the ECT counts.

and size imaging system efficiency imaging time and attenuation factors  
Dissert Abstr

**N78-33709** Ohio Univ Athens  
**THE EFFORT OF NOISE EXPOSURE ON THE MASKING LEVEL DIFFERENCE Ph.D. Thesis**

Stephan Edward Oshrin 1978 82 p  
Avail Univ Microfilms Order No 7812002

Pre-exposure masking level differences (MLDs) and binaural thresholds in quiet were recorded for six young adults with normal hearing prior to their being exposed to broad band noise ranging in intensity from 60 SPL to 108 SPL Following the exposure, post-exposure MLDs were recorded at 1, 3, 5, 10, and 20 minutes after exposure Additionally binaural thresholds in quiet were recorded at 2 minutes and 20 minutes after noise exposure Although there was no significant change in the binaural thresholds in quiet, a significant reduction in the MLD takes place at 1 minute after exposure at all exposure intensities The decrease in MLD was temporary and brief The possible causative factors for the decrease in MLD include tinnitus and tonal alterations of the pure tone stimuli caused by the noise exposure

Dissert Abstr

**N78-33710\*** National Aeronautics and Space Administration, Washington, D C  
**THE PREVENTIVE ROLE OF ULTRAVIOLET RADIATION DURING EXPOSURE TO IONIZING RADIATION**

G S Yatsula May 1978 9 p refs Transl into ENGLISH from Gig Sanit (USSR), no 2 Feb 1978 p 48-52 Transl by Sci Transl Serv Santa Barbara, Calif  
(Contract NASw-2791)  
(NASA-TM-75106) Copyright Avail NTIS HC A02/MF A01 CSDL 06R

The effect of suberythematous doses of ultraviolet and ionizing radiation on sulfhydryl groups cholesterol and hemoglobin of the blood is studied  
Author

**N78-33711** California Inst of Tech Pasadena  
**HYSTERESIS IN HUMAN BINOCULAR FUSION A SECOND LOOK Ph.D Thesis**

Daniel Bruce Diner 1978 110 p  
Avail Univ Microfilms Order No 78-15970

Using binocular retinally stabilized images a stimulus regime was designed to determine the size and location of Panum's fusional area at any given stimulus condition This regime was employed to measure Panum's fusional area in the non-extended and in the extended conditions The following three results were obtained (1) The nasalward limits of Panum's fusional area and the hysteresis demonstrated by the nasalward limits do not differ significantly from the temporalward limits (2) a non-transient stimulus will fuse over a significantly wider range with a transient stimulus than with another non-transient stimulus and (3) the extension of Panum's fusional area not only includes the recruitment of retinal locations into Panum's fusional area which are not normally in Panum's fusional area but also includes the loss from Panum's fusional area of certain retinal locations which are normally within Panum's fusional area  
Dissert Abstr

**N78-33712** Georgia Inst of Tech, Atlanta  
**FAST NEUTRON DEPTH DOSE DISTRIBUTIONS IN A HETEROGENEOUS PHANTOM Ph.D Thesis**

Joseph John Shonka 1978 118 p  
Avail Univ Microfilms Order No 7816664

A Monte Carlo code was developed to calculate parameters of interest in the reference man series of phantoms Results obtained from the code for an A-P exposure of the left lung included the absorbed dose to various organs and the depth dose distribution, neutron spectra, and LET spectra Experimental measurements were made for four cases a homogeneous soft tissue phantom and heterogeneous phantoms with soft tissue and lung soft tissue and skeleton, and soft tissue with lung and skeleton respectively These measurements were made in a physical mockup of organs filled with equivalent substitutes for skeleton lung, and soft tissue A small tissue-equivalent proportional counter a tissue-equivalent ionization chamber, and an energy compensated G-M tube were used From all techniques, total dose, LET fast neutron dose and gamma dose were derived as a function of depth in the thoracic region  
Dissert Abstr

**N78-33713\*** National Aeronautics and Space Administration Washington D C  
**THE LUMBOSACRAL SEGMENT AS A VULNERABLE REGION IN VARIOUS POSTURES**

B Rosemeyer Oct 1978 6 p Transl into ENGLISH from Orthopaed Praxis (West Germany) v 13 no 8 1977 p 537-539 Transl by Kanner (Leo) Associates Redwood City, Calif Original doc prep by Munich Univ  
(Contract NASw-3199)  
(NASA-TM-75579) Copyright Avail NTIS HC A02/MF A01 CSDL 06P

The lumbosacral region in man is exposed to special static and dynamic load In a supine position the disc size increases because of the absence of axial load In a standing position, with physiological posture of the spine, strain discomfort occurs which is increased even more in the sitting position due to the curvature of the lumbar region of the spine and the irregular distribution of pressure in the discs as a result of this This special problem of sitting posture can be confirmed by examinations  
Author

**N78-33714** Wayne State Univ Detroit Mich  
**THE INTERACTION BETWEEN THE UTRICLES AND THE SEMICIRCULAR CANALS DURING ECCENTRIC ROTATION Ph.D. Thesis**

Glenn Douglas Cummings 1978 212 p  
Avail Univ Microfilms Order No 78-16016

Human subjects were rotated in a cupulometer (a rotating chair with precisely controlled velocities and accelerations) and their eye movements were recorded electronystagmographically Habituation was not shown to have a significant effect upon any of the parameters of nystagmus with repeated stimulations The adaptation model was shown to provide a better fit to the nystagmus data than the torsion pendulum model The linear acceleration produced by eccentric rotation was shown to indirectly modify the nystagmus induced by angular acceleration This modification in the nystagmus was effected at the peripheral level and was manifest as a change in the time constant associated with the dynamics of the semicircular canals The otoliths of the utricles are stimulated by the linear acceleration, this in turn may stimulate the efferent system to the cupula affecting the stiffness of the cupula, thus causing the change in time constant of the semicircular canals  
Dissert Abstr

**N78-33715\*#** National Aeronautics and Space Administration Pasadena Office Calif  
**OPTICAL PROBE Patent Application**

Robert E Frazer inventor (to NASA) (JPL) Filed 6 Mar 1978 11 p Sponsored by NASA  
(NASA-Case-NPO-14247-1 US-Patent-Appl-SN-883383) Avail NTIS HC A02/MF A01 CSDL 06B

A rectal probe which provides a view to the side of the probe end instead of just a straight ahead view is disclosed The probe includes a ring-shaped window and a reflective coating on a lens located near the window The reflective coating directs light passing in through the window towards the eye piece end of the probe The probe includes a fiber optic bundle The reflective coating and lenses focus the light onto the end of the fiber optic bundle Another set of lenses focuses light from in front of the probe onto the center of the fiber optic bundle NASA

**N78-33716\*#** Jet Propulsion Lab Calif Inst of Tech, Pasadena  
**TISSUE IDENTIFICATION BY ULTRASOUND**

D H LeCrossette, R C Heyser, P M Gammell and R L Wilson (Harbor General Hosp Los Angeles) 15 Oct 1978 88 p refs  
(Contract NAS7-100)  
(NASA-CR-157776 JPL-Pub-78-90) Avail NTIS HC A05/MF A01 CSDL 06B

The ultrasonic properties of animal and human soft tissue were measured over the frequency range of 1.5 to 10.0 MHz The method employed a swept-frequency coherent technique known as time delay spectrometry Measurements of attenuation versus frequency on liver, backfat kidney, pancreas spleen breast and other tissue were made Considerable attention was paid to tissue handling and in determining the effects of fixing on the attenuation of ultrasound in the tissue  
G G

**N78-33717\*** National Aeronautics and Space Administration  
Ames Research Center Moffett Field Calif

**MICRO-FLUID EXCHANGE COUPLING APPARATUS Patent Application**

John E Johnson (San Francisco Univ Calif) and Paul F Swartz  
inventor (to NASA) Filed 16 Oct 1978 13 p  
(NASA-Case-ARC-11114-1, US-Patent-Appl-SN-951422) Avail  
NTIS HC A02/MF A01 CSCL 06B

In a microfluid exchange apparatus for exchanging fluid with an organ such as the trachea or a blood vessel of a small animal a syringe needle is provided for penetrating the fluid conduit of the animal. The syringe needle is coupled to a plenum chamber having an inlet and outlet port. The plenum chamber is coupled to the syringe needle via the intermediary of a standard quick disconnect coupling fitting. The plenum chamber is carried at the end of a drive rod which is coupled to a micrometer drive head. The micrometer drive head is slidably and pivotably coupled to a pedestal for adjusting the height and angle of inclination of the needle relative to a reference base support. The needle is positioned adjacent to the incised trachea or a blood vessel of a small animal and the micrometer drive head is operated for penetrating the fluid conduit of the animal.

NASA

**N78-33718\*** Tracor Jitco Inc Rockville Md  
**FORMATION AND MANAGEMENT OF AN EXPERT TOXICOLOGICAL REVIEW TEAM FOR LITERATURE SEARCH, EVALUATION AND ORGANIZATION OF CURRENTLY AVAILABLE RAPID TOXICOLOGICAL TESTS, VOLUME 1 Final Report, 30 Sep 1977 - 28 Apr 1978**

Arthur J Shanahan Apr 1978 144 p refs  
(Contract DAMD17-77-C-7056 DA Proj 3E1-61102-BS-04)  
(AD-A056311) Avail NTIS HC A07/MF A01 CSCL 06/20

The objective of this study was to determine the feasibility of identifying short term in vivo or in vitro toxicity tests which could be included in a battery of such tests as part of a toxicological screening program. The study was performed by a panel of ten toxicology experts and a contractor management team which included scientific information specialists. Six compounds (benzene cadmium formaldehyde phosphorus phosgene oxides of nitrogen) were chosen as models for analysis by a matrix format. Each matrix was supported by a review article. Panel members selected predictive endpoints from acute and subchronic data taken from the literature. The panel also recommended short-term tests relevant to the endpoints for each compound. Position papers were developed for pharmacokinetics behavioral toxicity in vitro testing reproductive assessment testing and a concept for toxicological testing. Bibliographies were prepared for the matrix reviews each position paper and one for the overall study. Based on the analyses of the matrices the position papers and their collective experience the panel developed recommendations for short-term tests for a minimal toxicology screening program and pointed out gaps wherein additional research was required. Author (GRA)

**N78-33719\*** Tracor Jitco Inc Rockville Md  
**FORMATION AND MANAGEMENT OF AN EXPERT TOXICOLOGICAL REVIEW TEAM FOR LITERATURE SEARCH, EVALUATION AND ORGANIZATION OF CURRENTLY AVAILABLE RAPID TOXICOLOGICAL TESTS, VOLUME 2 Final Report, 20 Sep. 1977 - 28 Apr 1978**

Arthur J Shanahan Apr 1978 456 p refs  
(Contract DAMD17-77-C-7056 DA Proj 3E1 61102-BS-04)  
(AD-A056312) Avail NTIS HC A20/MF A01 CSCL 06/20

The objective of this study was to determine the feasibility of identifying short-term in vivo and in vitro toxicity tests which could be included in a battery of such tests as part of a toxicological screening program. The study was performed by a panel of ten toxicology experts and a contractor management team which included scientific information specialists. Six compounds (benzene cadmium formaldehyde phosphorus phosgene oxides of nitrogen) were chosen as models for analysis by a matrix format. Each matrix was supported by a review article. Panel members selected predictive endpoints from acute and subchronic data taken from the literature. The panel also recommended short-term tests relevant to the endpoints for each compound. Position papers were developed for pharmacokinetics

behavioral toxicity in vitro testing reproductive assessment testing and a concept for toxicological testing. Bibliographies were prepared for the matrix reviews each position paper and one for the overall study. Based on the analyses of the matrices the position papers and their collective experience the panel developed recommendations for short-term tests for a minimal toxicology screening program and pointed out gaps wherein additional research was required. Author (GRA)

**N78-33720\*** Battelle Pacific Northwest Labs Richland Wash  
**COMPILATION AND ASSESSMENT OF MICROWAVE BIOEFFECTS, AO-02-01/FAS1028 A SELECTIVE REVIEW OF THE LITERATURE ON BIOLOGICAL EFFECTS OF MICROWAVES IN RELATION TO THE SATELLITE POWER SYSTEM Final Report**

D R Justesen H A Ragani I E Rogers A W Guy D L Hjerresen and W T Hinds Mar 1978 91 p refs  
(Contract EY-76-C-06-1830)

(PNL-2634) Avail NTIS HC A05/MF A01

Literature on the biological effects of microwaves is reviewed with regard to one of the following (1) cardiovascular responses (2) cataracts, (3) gonad response (4) genetics (5) teratology and (6) hematology. Appendices are included on biophysical aspects of microwave radiation and a glossary of biophysical terms. A bibliography containing more than 100 references is also included. Author (ERA)

**N78-33721\*** Los Alamos Scientific Lab N Mex Health Physics Group

**ADVANCES IN HUMAN INTERNAL RADIATION COUNTING AT LOS ALAMOS. MULTIPLE SIMULTANEOUS IN-VIVO MEASUREMENTS**

C John Umbarger and Leon West 1978 12 p refs Presented at the IAEA Intern Symp on Advan in Radiation Project Monitoring Stockholm, 26 Jun 1978

(Contract W-7405 eng-36)

(LA-UR-78 1063 Contract-780612-2 IAEA-SM-229/65) Avail NTIS HC A02/MF A01

In order to improve the health physics surveillance program for radiation workers at the Los Alamos Scientific Laboratory (LASL) the In-Vivo Measurements Laboratory at LASL were upgraded to provide four separate yet simultaneous photon spectral measurements on a single individual, with each spectrum providing different information. The four spectra are acquired with the following four detectors and respective energy regions: the NaI portion of twin phoswich detectors placed over the chest of the subject and monitoring the 10 to 140 keV photon region; the CsI portion of the same phoswich detectors and monitoring the energy region from 200 to 2000 keV; a large planar hyperpure germanium detector placed directly over the liver area of the prone subject and monitoring the region 10 to 250 keV; and a large volume Ge(Li) detector placed directly under the prone subject and monitoring the region 55 to 2000 keV. ERA

**N78-33722\*** Bonneville Power Administration, Portland, Oreg  
**ELECTRICAL AND BIOLOGICAL EFFECTS OF TRANSMISSION LINES A REVIEW**

J M Lee Jr T D Bracken A S Capon S H Sarkinen, G M Ihle, D E Perry, and T R Eyler Jun 1977 67 p refs  
Sponsored by DOE

(BPA-BIO-77-1) Avail NTIS HC A04/MF A01

The electrical effects of ac and dc transmission lines are described and the state-of-the-art knowledge on the possible biological effects of such lines is reviewed. Electrical effects are defined as those resulting from electric and magnetic fields and corona. The fields can induce currents and voltages in plants and animals. Corona produced audible noise electromagnetic interference and small amounts of oxidants (e.g. ozone). The possible biologic effects of these electrical parameters and practices used to mitigate adverse effects are described. Field effects on cardiac pacemakers fences irrigation equipment, and flammable materials are considered. ERA

**N78-33723#** Maryland Univ Baltimore Div of Pulmonary Diseases

**EFFECTS OF NITROGEN DIOXIDE ON PULMONARY FUNCTION IN HUMAN SUBJECTS**

David H Kerr Apr 1978 31 p refs Prepared in cooperation with Johns Hopkins Univ Baltimore Md (Contract EPA-68-02-1745)

(PB 281186/7) Avail NTIS HC A03/MF A01 CSCL 06T

Subjects with asthma and were exposed to 0.5 ppm of nitrogen dioxide (NO<sub>2</sub>) for two hours in an environmental chamber. They engaged in one 15-minute light to medium-exercise stint on a bicycle ergometer during this period. The subjects with asthma experienced the greatest symptoms with exposure to NO<sub>2</sub> i.e. seven of thirteen noting slight burning of the eyes, slight headache, and chest tightness or labored breathing with exercise. One each of the subjects with chronic bronchitis experienced slight nasal discharge. Significant changes from control values for the group as a whole with exposure to NO<sub>2</sub> were observed for some pulmonary function tests. GRA

**N78-33724#** National Technical Information Service, Springfield Va

**HYPERBARIC OXYGENATION A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1964 - Jun 1978**

Elizabeth A Harrison Jul 1978 164 p Supersedes NTIS/PS-77/0600 NTIS/PS-76/0526 NTIS/PS-75/236

(NTIS/PS-78/0676/3 NTIS/PS-77/0600 NTIS/PS-76/0526 NTIS/PS-75/236) Avail NTIS HC \$28.00/MF \$28.00 CSCL 06S

Research reports discussing microbiology, respiratory infections, oxygen toxicity, diving, decompression sickness, and metabolism as applied to hyperbaric oxygenation are covered in the citations. (This updated bibliography contains 157 abstracts, 4 of which are new entries to the previous edition.) GRA

**N78-33725#** Bureau of Radiological Health, Rockville Md Div of Biological Effects

**PHYSICAL MECHANISMS FOR BIOLOGICAL EFFECTS OF ULTRASOUND**

Wesley L Nyborg Sep 1977 70 p refs Sponsored in part by Catholic Univ of America and HEW

(PB-282234/4 FDA/BRH-78/99 DHEW/PUB/FDA-78/8062) Avail NTIS HC A04/MF A01 CSCL 06R

Physical mechanisms are reviewed by which ultrasound produces changes in living systems. When ultrasound is applied to aqueous suspensions of macromolecules or cells and heat avoided, enzymes may be inactivated or cells modified. The mechanism is usually sonic cavitation. Mechanisms identified when heat is ruled out are radiation force, radiation torque, and acoustic microstreaming. Lowest intensity levels are compared at which effects on mammalian tissues were reported with current medical diagnostic levels. GRA

**N78-33726#** National Technical Information Service, Springfield Va

**ANTHROPOMETRY BASIC STUDIES AND APPLICATIONS. VOLUME 2 A BIBLIOGRAPHY WITH ABSTRACTS Progress Report, 1976 - Jul 1978**

Carolyn Shonyo Aug 1978 80 p Supersedes NTIS/PS-77/0757 NTIS/PS-76/0679 NTIS/PS-75/629

(NTIS/PS-78/0866/0 NTIS/PS-77/0757 NTIS/PS-76/0679 NTIS/PS-75/629) Avail NTIS HC \$28.00/MF \$28.00 CSCL 06N

Research studies are abstracted relative to anthropometric measurements for use in designing military and civilian protective equipment and clothing, automobile interiors and air bag restraint systems, aircraft cabins and aircraft seats. Reports on the design of anatomical models, computerized simulation of the human body, and anthropometry as related to the strength of body members and physical fitness are included. This updated bibliography contains 73 abstracts. GRA

**N78-33727#** Joint Publications Research Service, Arlington Va

**TRANSLATIONS ON USSR SCIENCE AND TECHNOLOGY BIOMEDICAL AND BEHAVIORAL SCIENCES, NO 45 EFFECTS OF NONIONIZING ELECTROMAGNETIC RADIATION**

22 Sep 1978 43 p refs Transl into ENGLISH from various Russian journals

(JPRS 71910) Copyright Avail NTIS HC A03/MF A01

Cellular and molecular effects of microwave electromagnetic fields on biological systems was investigated. The effects of millimeter radio waves on bio systems were also reviewed, along with the combined effect of SHF fields and high temperatures on the human body.

**N78-33728#** Joint Publications Research Service, Arlington, Va

**CELLULAR AND MOLECULAR EFFECTS AND THE MECHANISM OF ACTION OF MICROWAVE ELECTROMAGNETIC FIELDS ON BIOLOGICAL SYSTEMS**

S L Arber In its Transl on USSR Sci and Technol Biomed and Behavioral Sci, No 45 (JPRS-71910) 22 Sep 1978 p 1-16 refs Transl into ENGLISH from Elektron Obrab Materialov (Moscow) no 3 1978 p 59-65

Copyright Avail NTIS HC A03/MF A01

Effects and mechanisms at the cellular, subcellular, and molecular levels were investigated. The electromagnetic field effects on cells were classified into two groups with the following characteristics: (1) particular orientation, alignment into a chain, or directed movement of unicellular animals; and (2) change in physiological functions. Conditions necessary for observation of biological effects of microwave are enumerated. J A M

**N78-33729#** Joint Publications Research Service, Arlington Va

**BIOMEDICAL EFFECTS OF MILLIMETER RADIO WAVES**

I S Cherkasov, V A Nedzvetskiy, A V Gilenko, and N I Progov In its Transl on USSR Sci and Technol Biomed and Behavioral Sci, No 45 (JPRS-71910) 22 Sep 1978 p 21-27 refs Transl into ENGLISH from Oftalmol Zh (Odessa), no 3 1978 p 187-190

Copyright Avail NTIS HC A03/MF A01

A comparative study of total planar preparations of the corneas of control and experimental animals did not reveal abnormal deviations in the morphological structure after exposure to millimeter waves. Computation results revealed differences in the mitotic activity of the epithelium of irradiated, nonirradiated, and control corneas. An exposure time of ten minutes caused an increase in the quantity of dividing cells in the irradiated cornea. J A M

**N78-33730#** Joint Publications Research Service, Arlington, Va

**THE COMBINED EFFECT OF AN SHF FIELD AND AN UNFAVORABLE MICROCLIMATE ON THE BODY**

V A Zhuravlev In its Transl on USSR Sci and Technol Biomed and Behavioral Sci, No 45 (JPRS-71910) 22 Sep 1978 p 31-35 Transl into ENGLISH from Voenno Med Zh (Moscow) no 3 1972 p 64-67

Copyright Avail NTIS HC A03/MF A01

The objective was to establish the effectiveness of the integrated action of microwaves on nonthermal intensities and combinations of individual microclimatic factors. The research was conducted on young female rats that had reached a weight of 155-160 gm by the beginning of the experiment. The experiment showed that exposure of rats to the unfavorable microclimate caused a significant rise in rectal temperature, this increase being most pronounced in response to the combined effect. J A M

**N78-33731\*#** National Aeronautics and Space Administration  
Langley Research Center Hampton, Va

**ADAPTATION OF TIME LINE ANALYSIS PROGRAM TO SINGLE PILOT INSTRUMENT FLIGHT RESEARCH**

David A Hinton (Louisville Univ) and John D Shaughnessy  
Aug 1978 41 p refs

(NASA-TM-78748) Avail NTIS HC A03/MF A01 CSCL 05H

A data base was developed for SPIFR operation and the program was run. The outputs indicated that further work was necessary on the workload models. In particular the workload model for the cognitive channel should be modified as the output workload appears to be too small. Included in the needed refinements are models to show the workload when in turbulence, when overshooting a radial or glideslope and when copying air traffic control clearances. G G

**N78-33732#** Air Force Inst of Tech Wright-Patterson AFB  
Ohio School of Engineering

**QUANTITATIVE PREDICTIONS OF LENGTH IN THE MUELLER-LYER ILLUSION AS PERCEIVED BY THE HUMAN VISUAL SYSTEM M.S. Thesis**

Charles Owen Cornell Mar 1978 108 p refs

(AD-A055706 AFIT/GE/EE/78M-9) Avail NTIS  
HC A06/MF A01 CSCL 05/10

The biologically derived bandwidth characteristics of the human visual system were used to determine the shape parameters of a filter. This filter was used as a model of the visual system to produce quantitative predictions of the Mueller-Lyer visual illusion. These predictions were compared to judgments of the length of the shaft of the illusion by human subjects. The best agreement between the subject data and the predictions of the model occurred when the filter had a double exponential shape, a bandwidth of or - 10 octave and a center spatial frequency between 2 and 4 cycles per object size. This is the first experiment to show that the filter model could predict similar quantitative distortions of length of the Mueller-Lyer visual illusion as reported by the human subjects. These results support the theory advocated by Arthur Ginsburg that the bandwidth limitations of the human visual system are responsible for geometric visual illusions as well as other visual phenomena such as the Gestalt principles of similarity, proximity and closure. Author (GRA)

**N78-33733#** Human Engineering Labs Aberdeen Proving  
Ground Md

**AN ANNOTATED BIBLIOGRAPHY OF THE LITERATURE DEALING WITH THE PHYSIOLOGICAL CORRELATES OF COGNITIVE PERFORMANCE Progress Report, 1965 - Jun 1977**

Nicholas J Carriero Michael W Cameron J D Craig, Jules L Demanss and John Fite Jr Jun 1978 503 p

(AD-A057113) Avail NTIS HC A22/MF A01 CSCL 05/8

This bibliography gathers the research literature that deals with physiological correlates of cognitive performance (broadly defined) in situations that have significance and import for military operations. In particular the focus is on studies that delineate the relationship between physiological variables and optimal or degraded performance. While the literature searched covered the period from 1965 to June 1977, earlier material was included when it was encountered. It contains over 1200 annotated items. Author (GRA)

**N78-33734#** Aeronautical Systems Div Wright-Patterson AFB  
Ohio

**AIR FORCE AIRCREW TRAINING DEVICES. MASTER PLAN Final Report**

Richard E Worthey Mar 1978 227 p refs Revised

(AD-A056940 ASD-TR-78-16) Avail NTIS HC A11/MF A01 CSCL 05/9

Aircrew training in the United States Air Force is addressed from the viewpoint of devices and technologies that are essential to aircrew proficiency, effectiveness and operational readiness. Major operating commands provided current and projected requirements for aircrew training devices for incorporation into formal training programs together with estimates of their impact on flight training. The impact of the instructional systems

development (ISD) process on each major operating command's training program is discussed. Issues surrounding the use of platform motion systems are addressed together with the Air Force's initiatives to resolve these issues. Air Force organizational responsibilities are presented and institutional and management problems are delineated. Air Force R and D and acquisition programs and schedules are shown and an initial attempt is made at diagrammatically depicting the interactions of these programs. Author (GRA)

**N78-33735#** Tennessee Univ Knoxville

**ESTIMATION OF THE OPERATING CHARACTERISTICS OF ITEM RESPONSE CATEGORIES 4. COMPARISON OF THE DIFFERENT METHODS**

Fumiko Samejima 30 Jun 1978 141 p

(Contract N00014-77 C 0360)

(AD-A057161, RR-78-3) Avail NTIS HC A07/MF A01 CSCL 05/10

The three methods of estimating the operating characteristics of item response categories have been developed and tried on a set of simulated data in which five hundred hypothetical examinees are assumed and their responses to test items are calibrated by the Monte Carlo method. They are Two-Parameter Beta Method, Normal Approach Method and Pearson System Method. There have been introduced three different categories of methods, i.e. Histogram Ratio Method, Curve Fitting Method and Conditional P.D.F. Method and they have been tried mainly within the context of the Two-Parameter Beta Method. In the present paper all the findings are summarized and pursued further in the attempt of reaching a tentative conclusion with the awareness that we need more varieties of different types of data to fully understand and appreciate each method and technique. Throughout these studies a polynomial of degree 3 or of degree 4 is used to approximate the marginal density function of the maximum likelihood estimate to distinguish degree 3 and 4 Cases from each other. Comparison is also made in an attempt to find out whether Degree 4 Case, which obviously has a theoretical advantage over Degree 3 Case, provides as with substantial gain in the accuracy of operating characteristic estimation. Author (GRA)

**N78-33736#** Northrop Corp Hawthorne Calif Aircraft  
Group

**PREDICTION, EVALUATION, AND SPECIFICATION OF CLOSED LOOP AND MULTIAxis FLYING QUALITIES Final Report, Mar - Dec 1977**

E D Onstott and W H Faulkner Feb 1978 278 p

(Contract F33615-77-C-3008)

(AD-A056983, NOR-77-162, AFFDL-TR-78-3) Avail NTIS  
HC A13/MF A01 CSCL 05/8

A general technology for the prediction, evaluation and specification of closed loop and multiaxis flying qualities is documented. A comprehensive scheme for the classification of precision piloted tasks is presented and a nonlinear multiaxis pilot model is described. Demonstrations of the aircraft/pilot/task analysis method are given for a number of precision piloted tasks and aircraft configurations. The analysis method is also applied to a comparison of Gaussian and non-Gaussian (Reeves) turbulence models and to a study of the effects of control system lags on tracking performance. Piloted flight simulations were performed to validate all pilot model analyses, complete simulation and pilot model data is presented. Specification methods suitable for MIL-F-8785B are suggested in the areas of step target tracking and pilot reserve attention capacity. A computer analysis method is available from AFFDL/FGC, a user guide, listing, and sample data set are included in the report. Author (GRA)

**N78-33737#** Civil Aeromedical Inst Oklahoma City, Okla  
**EVALUATION OF SEATING AND RESTRAINT SYSTEMS AND ANTHROPOMORPHIC DUMMIES CONDUCTED DURING FISCAL YEAR 1977**

Richard F Chandler and Edwin M Trout Jun 1978 73 p  
refs

(AD-A056905 FAA-AM-78-24) Avail NTIS  
HC A05/MF A01 CSCL 01/3

The results of test programs conducted by the Protection and Survival Laboratory to investigate the performance of prototype or operational seating and restraint systems relative to their ability to provide protection against crash injury and to investigate the performance of anthropomorphic dummies in the dynamic environment are reported. LS

**N78-33738#** Army Aeromedical Research Lab Fort Rucker, Ala  
**VISUAL PERFORMANCE/WORKLOAD OF HELICOPTER PILOTS DURING INSTRUMENT FLIGHT** Final Report  
 Ronald R Simmons, Michael A Lees, and Kent A Kimball Jan 1978 81 p refs  
 (DA Proj 3E7-62173-A-819)  
 (AD-A055424 USAARL-78-6) Avail NTIS HC A05/MF A01 CSCL 05/9

Flight under instrument flight rules (IFR) is reported to be one of the most important factors contributing to aviator fatigue during helicopter operations. This study was initiated to collect visual and psychomotor performance data in an attempt to investigate and study the general visual performance of aviators during IFR conditions. Two groups of aviators with varied experience levels were the subjects. A NAC Eye Mark Recorder and the Helicopter In-Flight Monitoring System were utilized to collect the required data. The results indicated among other findings that pilot subjective opinion does not agree with objective data. Additionally, the attitude indicator and radio compass comprised over 60% of the pilots' total visual workload, while the aircraft's status gauges were monitored less than 10% of the total time. These data should provide invaluable information concerning the visual requirements of pilots for safe helicopter operations. Author (GRA)

**N78-33739#** Air Force Human Resources Lab Brooks AFB Tex  
**EFFECTS OF PLATFORM MOTION, VISUAL AND G-SEAT FACTORS UPON EXPERIENCED PILOT PERFORMANCE, IN THE FLIGHT SIMULATOR** Final Report, Apr 1976 - Mar 1977  
 Philip A Irish III and George H Buckland Jun 1978 43 p refs  
 (AD-A055691 AFHRL-TR-78-9) Avail NTIS HC A03/MF A01 CSCL 05/5

The objective of this study was to empirically assess the performance of experienced pilots in the Advanced Simulator for Pilot Training (ASPT) under varying platform motion. G-seat field-of-view and ceiling/visibility conditions. Five experienced T-37 pilots flew five contact and instrument maneuvers in the ASPT under all combinations of the independent variables. Automated performance measures based on system parameters, pilot inputs and derived scores were collected and analyzed. The results indicated that expert performances were affected by the motion field-of-view and ceiling/visibility variables and were often manifested as changes in control behavior rather than vehicle performance. Author (GRA)

**N78-33740#** Air Force Human Resources Lab Brooks AFB Tex  
**G-SEAT COMPONENT DEVELOPMENT** Final Report, 1 Jul 1975 - 30 Mar 1977  
 William B Alberty and Erick D Hunter Jun 1978 32 p refs  
 (AD-A055533, AFHRL-TR-78-18) Avail NTIS HC A03/MF A01 CSCL 05/9

An effort was conducted to investigate the improved performance of a closed-loop G-seat system. The Air Force and Navy are currently using G-seats in several training and fighter simulators. These devices are all open-loop systems and exhibit excessive time delays. While these seats exhibit good sustained cueing capability, their performance is marginal in producing overall acceleration cues. Because of sluggish response characteristics, virtually none of the seats can give appropriate acceleration onset cues and be in synchronization with current visual systems. Conventional G-seat components were obtained as well as advanced position feedback metal bellows, and a closed-loop

pneumatic control system was designed and developed. The open- and closed-loop performance of this system was evaluated and the contribution of each component in the G-seat hardware was analyzed. Transfer functions were developed for the pneumatic control system. Author (GRA)

**N78-33741#** Air Force Human Resources Lab Brooks AFB Tex  
**EMULATION OF AN ADVANCED G-SEAT ON THE ADVANCED SIMULATOR FOR PILOT TRAINING** Final Report, 20 Dec 1975 - 7 Apr 1977  
 William B Alberty and Danny C McGuire Apr 1978 36 p refs  
 (AD-A055532, AFHRL-TR-78-4) Avail NTIS HC A03/MF A01 CSCL 05/9

An in-house effort was initiated to investigate simple G-seat hardware configurations for the purpose of developing a low-cost approach to G-cueing simulation in flight trainers. The G-seat is a motion and force simulation device which replaces the aircraft seat in a flying training simulator, by virtue of its geometry and software drive. It imparts tactile cues to the seated pilot which are representative of the seat forces normally experienced in actual flight. The Air Force and Navy are procuring G-seats for both training and fighter simulators. These G-seats are research devices, and have up to 32 actuators distributed in the seat pan, backrest, and lap belt. These seats can be improved upon with respect to simpler geometry, fewer active components, and more effective drive algorithms. This report describes a research effort on the Air Force's Advanced Simulator for Pilot Training (ASPT) which culminated in the emulation of an advanced approach to G-seat simulation. The development of the software, the design of the advanced seat components, the implementation of the advanced design on the ASPT, and the results of the study are presented. Author (GRA)

**N78-33742#** International Business Machines Corp., Oswego, NY Federal Systems Div  
**PROGRAM DOCUMENTATION FOR THE TERRAIN AND FLIGHT DYNAMICS PROGRAM**  
 W E Brandt, Jr and K A Aldrich (Systems Res Labs, Inc., Dayton, Ohio) May 1978 36 p  
 (Contract F33615-75-C-5152 F33615-75-C-0127)  
 (AD-A056116 AMRL-TR-78-35, AMRC-HESS-78-2) Avail NTIS HC A03/MF A01 CSCL 05/9

The Terrain and Flight Dynamics (TFD) Program is a real-time interactive graphics system developed to support the Helmet-Mounted-Display Processor (HMDP) activities. The primary task of the TFD Program is to simulate airframe movement and to supply the resultant dynamic values of aircraft state to the HMDP. Other tasks include the production of an instrument display and a dynamic perspective terrain display. Both displays are on the IBM 2250 and can be remotely viewed by TV to the F-16 cockpit if desired. A cockpit selector switch was installed to allow the aircraft to be controlled by either of two sets of cockpit controls, one set in the F-16 cockpit and one set at the 2250 display unit. The program was written for an IBM System/370, Model 155 computer operating under the standard MVT version of the Operating System. Both assembler language and FORTRAN were used in coding the subroutines and the IBM 2250 Graphics Programming Services were utilized for the graphic software support. Author (GRA)

**N78-33743#** Canyon Research Group Inc Westlake Village, Calif  
**DESIGN, ANALYSIS, AND INTERPRETATION OF SCREENING STUDIES FOR HUMAN FACTORS ENGINEERING RESEARCH, REVISION** Technical Report, Sep 1976 - Sep 1977  
 Charles W Simon Jun 1978 239 p refs Revised  
 (Contract F44620-76-C-0008)  
 (AD-A056985, CWS-03-77A AFOSR-78-0055TR-Rev) Avail NTIS HC A11/MF A01 CSCL 05/5

Methods are described for constructing Resolution IV screening designs that are robust to linear, quadratic, and cubic trend effects and will also keep the number of factor-level changes

for some variables at a minimum. Complete designs, capable of screening up to 32 variables, are provided along with appropriate methods of analysis. Numerous criteria for selecting non-trivial variables are discussed including mean difference eta squared, cumulative probability, and half-normal plots. How to handle subjects in an experiment is described when their characteristics can be included as experimental factors and when they cannot be, and when subjects are merely a form of replication. Lack-of-fit tests are provided to help decide whether a second- or a third-order response surface is needed. Numerous methods of analyzing screening studies with multiple responses are described. A method is given for developing a prediction equation with data collected from an incompleeted screening design. GRA

**N78-33744#** Fitzpatrick Engineering, Santa Barbara, Calif  
**VEHICLE INTEGRATION AND EVALUATION OF ADVANCED RESTRAINT SYSTEMS. RESTRAINT SYSTEM ANALYSIS REPORT. Final Report, Oct. 1977 - Feb 1978**  
 Michael U Fitzpatrick Dec 1977 205 p  
 (Contracts DOT-HS-6-01307, DOT-NHTSA-8-0147)  
 (PB-281475/4) Avail NTIS HC A10/MF A01 CSCL 13F

The results of sled testing and vehicle crash testing of four advanced restraint systems in a compact size automobile are reported. These results were then used to construct a crash survivability envelope for the front seat occupants of the subject vehicle in a variety of accident modes. The vehicle chosen for this effort was the 1976 Volvo 244. The restraint systems chosen to be integrated into the Volvo were (1) advanced driver airbag system, (2) advanced passenger airbag system, (3) force-limited airbelt system, and (4) force-limited 2-inch belt system. GRA

**N78-34032#** Joint Publications Research Service, Arlington Va  
**BIOLOGICAL EXPERIMENTS ON BOARD SALYUT-6**  
 Aleksandr Kamin *In its* Transl on USSR Sci and Technol Phys Sci and Technol No 49 (JPRS-71896) 20 Sep 1978 p 26-32 Transl into ENGLISH from Tekhnika-molodezhi (Moscow), no 6, 1978 p 12-13

Copyright Avail NTIS HC A04/MF A01

A description is given of the experiments carried out on Salyut-6 while in space. It is explained how weightlessness retards the growth of higher plants. A discussion is presented of the effects of gravity on cell division. L S

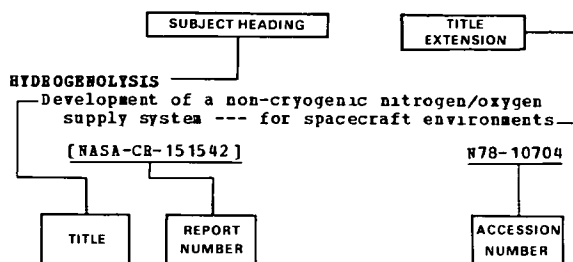


# SUBJECT INDEX

AEROSPACE MEDICINE AND BIOLOGY / *A Continuing Bibliography (Suppl 188)*

JANUARY 1979

## Typical Subject Index Listing



The title is used to provide a description of the subject matter. When the title is insufficiently descriptive of the document content, a title extension is added separated from the title by three hyphens. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

## A

### ABIOTHEGENESIS

- Formation of early earth regolith --- origins of life  
A78-50277
- Chemical evolution and the origin of life -  
Bibliography supplement 1976  
A78-53875

### ACCELERATION (PHYSICS)

- Development and validation of drive concepts for an advanced G-cueing system --- fighter/attack aircraft flying training simulators  
[AIAA 78-1571]  
A78-50652
- Development of the Advanced G Cueing System --- tactical flight simulators  
[AIAA 78-1572]  
A78-50653
- The effect of helmet loader G-cueing on pilot's simulator performance  
[AIAA 78-1573]  
A78-50654

### ACCELERATION STRESSES (PHYSIOLOGY)

- Effect of impulse accelerations on the condition of the cardiovascular system of healthy people  
A78-52274
- Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates  
N78-32674
- Changes in electroencephalograms and autonomic reactions of rats to accelerations  
N78-32684
- On the possible role of lysosomal proteinases in the biological effects of accelerations  
N78-32685
- Regional redistribution of blood during the immediate aftereffect period following exposure of rats to transverse accelerations  
N78-32693

### ACID BASE EQUILIBRIUM

- Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise  
A78-52545

### ACOUSTIC MEASUREMENTS

- Tissue identification by ultrasound  
[NASA-CR-157776]  
N78-33716

### ACOUSTIC SIMULATION

- Bleeding into inner ears of chinchillas caused by simulated sonic boom  
A78-51847

### ACRYLONITRILES

- Acrylonitrile  
[PB-280478/9]  
N78-32713

### ACTIVITY (BIOLOGY)

- Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
A78-53874

### ACTIVITY CYCLES (BIOLOGY)

- Circadian rhythm dissociation in an environment with conflicting temporal information  
A78-52699

### ADIPOSE TISSUES

- Controlled cellular energy conversion in brown adipose tissue thermogenesis  
A78-52698

### AERODYNAMIC LOADS

- Accurately reproducing pilot's control forces in a flight simulator  
[AIAA 78-1585]  
A78-50663

### AEROEMBOLISM

- Hyperbaric oxygenation. A bibliography with abstracts  
[NTIS/PS-78/0676/3]  
N78-33724

### AEROSPACE ENVIRONMENTS

- Inhibition of bone formation during space flight  
A78-51225

### AEROSPACE MEDICINE

- Space biology and aerospace medicine, no. 4  
[JPRS-71830]  
N78-32672
- Cooling system for removing metabolic heat from an hermetically sealed spacesuit  
[NASA-CASE-ARC-11059-1]  
N78-32721

### APPERTENT NERVOUS SYSTEMS

- Dynamics of afferent impulsion in posterior spinal radices of dogs with restricted movement  
N78-32696

### AFTERIMAGES

- Binocular interactions during establishment of McCollough effects --- color aftereffects  
A78-51955

### AGE FACTOR

- Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
A78-50531

### AIR POLLUTION

- Effects of nitrogen dioxide on pulmonary function in human subjects  
[PB-281186/7]  
N78-33723

### AIR TO AIR REFUELING

- A unique approach to aerial refueling simulation for training boom operators  
[AIAA 78-1591]  
A78-50666

### AIR TRAFFIC CONTROL

- Human-factors optimization of displays and control units for pilot and copilot  
A78-50267
- Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres  
A78-51348

### AIR TRAFFIC CONTROLLERS (PERSONNEL)

- Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres  
A78-51348
- Objective assessment of prior air traffic control-related experience through the use of an occupational knowledge test  
A78-52636
- Use of path models to study a precareer air traffic control training program  
A78-52641
- Comparison of the vigilance performance of men and women using a simulated radar task  
A78-52642

- Three reports relevant to stress in aviation personnel  
[AD-A051690] N78-32699
- Development of the aviation stress protocol: Simulation and performance, physiological, and biochemical monitoring systems, phase 1  
N78-32700
- The relationship between stress-related metabolites and disqualifying pathology in air traffic control personnel  
N78-32702
- The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success  
[AD-A055009] N78-32722
- AIR TRANSPORTATION**  
Movement by helicopter of patients with decompression sickness  
A78-52645
- AIRCRAFT ACCIDENTS**  
U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75  
A78-52644
- AIRCRAFT CONTROL**  
Accurately reproducing pilot's control forces in a flight simulator  
[AIAA 78-1585] A78-50663
- AIRCRAFT DESIGN**  
A review of human factors engineering studies at Aeromedical Laboratory  
A78-51498
- AIRCRAFT INSTRUMENTS**  
Human-factors optimization of displays and control units for pilot and copilot  
A78-50267
- AIRCRAFT LANDING**  
Visual problems of pilots - Study on distance judgement of pilots  
A78-51500
- AIRCRAFT PILOTS**  
Verification of workload - A job for simulation --- pilot performance  
[AIAA 78-1586] A78-50664
- AIRCRAFT SAFETY**  
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977  
[AD-A056905] N78-33737
- ALTITUDE ACCLIMATIZATION**  
Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537
- Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude  
A78-53711
- ALTITUDE TOLERANCE**  
The effects of altitude and two decongestant-antihistamine preparations on physiological functions and performance  
[AD-A054793] N78-32706
- AMINO ACIDS**  
Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work  
A78-52638
- Aminoacyl-tRNA synthetase families and their significance to the origin of the Genetic Code  
A78-53873
- Dynamics of free amino acid levels in human blood plasma during bed rest in head down position  
N78-32677
- ANAEROBES**  
Anaerobic utilization of phosphite and hypophosphite by *Bacillus* sp.  
A78-53625
- ANGULAR ACCELERATION**  
Investigation of the influence of prolonged rotation on radiation lesions  
N78-32682
- ANTHROPOMETRY**  
Configuration of the chest wall during increased gravitational stress in erect humans  
A78-53709
- Three-dimensional anthropometry of the adult face --- bioengineering for protective breathing equipment  
[AD-A054938] N78-32705
- Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts  
[NTIS/PS-78/0866/0] N78-33726
- ANTI-HISTAMINICS**  
The effects of altitude and two decongestant-antihistamine preparations on physiological functions and performance  
[AD-A054793] N78-32706
- Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, +Gz, and fatigue tolerances --- pilot performance  
[AD-A055089] N78-32707
- ARMED FORCES (UNITED STATES)**  
Air Force aircrew training devices: Master plan  
[AD-A056940] N78-33734
- ARTERIES**  
Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
A78-50531
- ARTERIOSCLEROSIS**  
Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
A78-50531
- ARTHROPODS**  
Mechanism for the formation of synaptic projections in the arthropod visual system  
A78-52372
- ASTRONAUT MANEUVERING EQUIPMENT**  
Manned maneuvering unit - A space platform support system  
[AIAA PAPER 78-1663] A78-51990
- ASTRONAUT PERFORMANCE**  
Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887
- ASTRONAUT TRAINING**  
Medical and psychological selection and training criteria for European SL-payload specialists  
[AAS PAPER 78-028] A78-53608
- Fifty minute in hydraulic weightlessness  
N78-33018
- ATTENTION**  
Comparison of the vigilance performance of men and women using a simulated radar task  
A78-52642
- ATTITUDE (INCLINATION)**  
Egocentric orientation is influenced by trained voluntary cyclorotary eye movements  
A78-51856
- AUDIOMETRY**  
An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla  
A78-53398
- AUDITORY DEFECTS**  
A scanning study of acoustic lesions of the cochlea  
A78-53397
- An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla  
A78-53398
- The relationship between comfortable loudness range and most comfortable loudness for pure tones and speech in sensorineural hearing loss  
N78-32698
- AUDITORY PERCEPTION**  
Inner ear biology; Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977  
A78-53391
- Fine morphology of the tectorial membrane - Fresh and developmental  
A78-53392
- A rheological model for research on cochlear hypoxia  
A78-53394
- The importance of the perilymphatic oxygen supply in the cochlea function  
A78-53395
- Auditory frequency selectivity and two-tone suppression in normal hearing human listeners  
N78-32697
- AUDITORY STIMULI**  
Functional evidence of efferent nerve endings in the human inner ear  
A78-53393

**AUTOMATION**

- Verification of workload - A job for simulation  
 --- pilot performance  
 [AIAA 78-1586] A78-50664

**AUTOMOBILES**

- Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report  
 [PB-281475/4] N78-33744

**AXES (REFERENCE LINES)**

- Three-dimensional anthropometry of the adult face  
 --- bioengineering for protective breathing equipment  
 [AD-A054938] N78-32705

**B****BACILLUS**

- Anaerobic utilization of phosphite and hypophosphite by *Bacillus* sp.  
 A78-53625

**BACTERIA**

- The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by *Halobacterium saccharovorum*  
 A78-53619

- Research and development of a luminol-carbon monoxide flow system  
 [NASA-CR-156832] N78-32671

**BACTERIOLOGY**

- Biological water quality monitoring using chemiluminescent and bioluminescent techniques  
 [NASA-CR-156830] N78-33702

**BARORECEPTORS**

- Sensory components of bite-force response in the rat  
 A78-51875

**BED REST**

- Diuretic renal function in man as related to different degrees of exercise during bedrest  
 N78-32675  
 Dynamics of free amino acid levels in human blood plasma during bed rest in head down position  
 N78-32677

**BIBLIOGRAPHIES**

- Chemical evolution and the origin of life - Bibliography supplement 1976  
 A78-53875  
 Altitude hypoxia. A bibliography with abstracts  
 [NTIS/PS-78/0443] N78-32711  
 Toxicity of gaseous halogenated organic compounds. A bibliography with abstracts  
 [NTIS/PS-78/0600/3] N78-32712  
 Annotated bibliography on biological effects of metals in aquatic environments, 3d  
 [PB-280953/1] N78-32715  
 Cryobiology. A bibliography with abstracts  
 [NTIS/PS-78/0678/9] N78-33707  
 Hyperbaric oxygenation. A bibliography with abstracts  
 [NTIS/PS-78/0676/3] N78-33724  
 Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts  
 [NTIS/PS-78/0866/0] N78-33726  
 An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
 [AD-A057113] N78-33733

**BINAURAL HEARING**

- The effort of noise exposure on the masking level difference  
 N78-33709

**BINOCULAR VISION**

- Visual problems of pilots - Study on distance judgement of pilots  
 A78-51500  
 Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation  
 A78-51871  
 Binocular interactions during establishment of McCollough effects --- color aftereffects  
 A78-51955  
 Binocular detection by normal and stereoblind observers  
 A78-53082  
 Hysteresis in human binocular fusion: A second look  
 N78-33711

**BIOASSAY**

- Research and development of a luminol-carbon monoxide flow system  
 [NASA-CR-156832] N78-32671  
 X-ray analysis of biological specimens  
 [UR-3490-1341] N78-33704

**BIOASTRONAUTICS**

- Life sciences laboratories in Spacelab  
 [AAS PAPER 78-011] A78-53613  
 The NASA Life Sciences experiment program for Shuttle/Spacelab  
 [AAS PAPER 78-010] A78-53615  
 Biological experiments on board Salyut-6  
 N78-34032

**BIOCHEMISTRY**

- Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
 A78-50531  
 Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness  
 A78-51300  
 The consolidation process and some of its neurochemical mechanisms  
 A78-51318  
 Computer display and manipulation of biological molecules  
 A78-53400  
 The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by *Halobacterium saccharovorum*  
 A78-53619  
 Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
 A78-53874

**BIOCONTROL SYSTEMS**

- Effect of hypokinesia on the contractile function and neural regulation of the heart  
 A78-53789

**BIOELECTRIC POTENTIAL**

- Changes in electroencephalograms and autonomic reactions of rats to accelerations  
 N78-32684  
 Dynamics of afferent impulsion in posterior spinal radices of dogs with restricted movement  
 N78-32696  
 The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain  
 N78-33701

**BIOELECTRICITY**

- Impedance cardiography for estimating cardiac output during submaximal and maximal work  
 A78-52544  
 Functional evidence of efferent nerve endings in the human inner ear  
 A78-53393

**BIOENGINEERING**

- Cryobiology. A bibliography with abstracts  
 [NTIS/PS-78/0678/9] N78-33707  
 Tissue identification by ultrasound  
 [NASA-CR-157776] N78-33716

**BIOGEOCHEMISTRY**

- Formation of early earth regolith --- origins of life  
 A78-50277  
 Anaerobic utilization of phosphite and hypophosphite by *Bacillus* sp.  
 A78-53625

**BIOINSTRUMENTATION**

- A subcutaneous channeling probe for implanting long leads  
 A78-51872  
 A microcinematographic method of studying the rate of circulation in the brain capillaries  
 A78-52400

**BIOLOGICAL EFFECTS**

- Inhibition of bone formation during space flight  
 A78-51225  
 Life sciences laboratories in Spacelab  
 [AAS PAPER 78-011] A78-53613  
 The NASA Life Sciences experiment program for Shuttle/Spacelab  
 [AAS PAPER 78-010] A78-53615

## BIOLUMINESCENCE

## SUBJECT INDEX

- Three reports relevant to stress in aviation personnel  
[AD-A051690] N78-32699
- Development of the aviation stress protocol: Simulation and performance, physiological, and biochemical monitoring systems, phase 1  
N78-32700
- Annotated bibliography on biological effects of metals in aquatic environments, 3d  
[PB-280953/1] N78-32715
- Biological effects of high strength electric fields on small laboratory animals  
[HCP/T1830-03] N78-33706
- Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system  
[PNL-2634] N78-33720
- Electrical and biological effects of transmission lines: A review  
[BPA-BIO-77-1] N78-33722
- Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation  
[JPRS-71910] N78-33727
- Biomedical effects of millimeter radio waves  
N78-33729
- The combined effect of an SHF field and an unfavorable microclimate on the body  
N78-33730
- BIOLUMINESCENCE**  
Biological water quality monitoring using chemiluminescent and bioluminescent techniques  
[NASA-CR-156830] N78-33702
- BIOMEDICAL DATA**  
The effect of various drugs on experimentally induced ulcers in immobilized rats  
[NASA-TM-75340] N78-32670
- BIOPHYSICS**  
Heat transfer principles in personal protection applications  
A78-51222
- Biophysics of photosynthesis  
A78-53848
- BIOSATELLITES**  
The mechanisms of development of morphological changes in mammals on biosatellites  
A78-50997
- Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite  
N78-32680
- BLOOD**  
Relationship between osmotic pressure of the blood and secretion of sweat  
[NASA-TM-75461] N78-33703
- The preventive role of ultraviolet radiation during exposure to ionizing radiation  
[NASA-TM-75106] N78-33710
- BLOOD CIRCULATION**  
Evaluation of regional blood filling by means of rheoplethysmography combined with functional tests  
N78-32676
- Regional redistribution of blood during the immediate aftereffect period following exposure of rats to transverse accelerations  
N78-32693
- BLOOD FLOW**  
Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Role of carotid chemoreceptors  
A78-52542
- A rheological model for research on cochlear hypoxia  
A78-53394
- Use of the auricle-floor temperature of the rabbit as an index of skin blood flow  
A78-53792
- BLOOD PLASMA**  
Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538
- Plasma volume changes with movement to supine and standing positions  
A78-52541
- Dynamics of free amino acid levels in human blood plasma during bed rest in head down position  
N78-32677
- BLOOD VOLUME**  
Plasma volume changes with movement to supine and standing positions  
A78-52541
- BODY FLUIDS**  
Evaporative water loss in man in a gravity-free environment  
A78-52543
- BODY KINEMATICS**  
Kaliuretic renal function in man as related to different degrees of exercise during bedrest  
N78-32675
- BODY SIZE (BIOLOGY)**  
Multinational Andean Genetic and Health Program. VII - Lung function and physical growth - Multivariate analyses in high- and low-altitude populations  
A78-52639
- BODY TEMPERATURE**  
The role of a decrease in body heat content in the thermoregulatory response of ear passageways  
A78-51661
- The effect of seawater on thermoregulator centers  
[NASA-TM-75443] N78-32669
- The effect of direct heating and cooling of heat regulation centers on body temperature  
[NASA-TM-75450] N78-32703
- BODY WEIGHT**  
The scaling of maximal oxygen consumption and pulmonary dimensions in small mammals  
A78-53710
- BONE MINERAL CONTENT**  
Inhibition of bone formation during space flight  
A78-51225
- BOOMS (EQUIPMENT)**  
A unique approach to aerial refueling simulation for training boom operators  
[AIAA 78-1591] A78-50666
- BRAIN**  
REM deprivation by stimulation of the reticular formation in the rat  
A78-53787
- BRAIN CIRCULATION**  
A microcinematographic method of studying the rate of circulation in the brain capillaries  
A78-52400
- Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Role of carotid chemoreceptors  
A78-52542
- The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain  
N78-33701
- BREATHING**  
Criteria for quantitative evaluation of respiratory system responses  
A78-53790
- C**
- C-135 AIRCRAFT**  
A unique approach to aerial refueling simulation for training boom operators  
[AIAA 78-1591] A78-50666
- CAPILLARY FLOW**  
A microcinematographic method of studying the rate of circulation in the brain capillaries  
A78-52400
- CARBOHYDRATE METABOLISM**  
The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by Halobacterium saccharovorum  
A78-53619
- CARBON MONOXIDE**  
Research and development of a luminol-carbon monoxide flow system  
[NASA-CR-156832] N78-32671
- CARBONATES**  
Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise  
A78-52545
- CARCINOGENS**  
Acrylonitrile  
[PB-280478/9] N78-32713

**CARDIAC VENTRICLES**

Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299

**CARDIOGRAPHY**

Impedance cardiography for estimating cardiac output during submaximal and maximal work  
A78-52544

**CARDIOVASCULAR SYSTEM**

Effect of impulse accelerations on the condition of the cardiovascular system of healthy people  
A78-52274

Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537

U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75  
A78-52644

Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates  
N78-32674

Physical fitness of permanent lowland and highland residents  
N78-32679

Assessment of cardiovascular function after exposure to the aviation stress protocol: Simulation  
N78-32701

Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, +Gz, and fatigue tolerances --- pilot performance  
[AD-A055089]  
N78-32707

Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system  
[PNL-2634]  
N78-33720

**CARTILAGE**

Effects of fracture trauma, estrone treatment, and a 2-G environment on the epiphyseal cartilage zones of developing avian radii  
A78-52643

**CATALYTIC ACTIVITY**

Photocatalytic oxidation of organic compounds on Mars  
A78-51137

**CELLS (BIOLOGY)**

Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity  
A78-51394

Regions of differential cell elongation and mitosis, and root meristem morphology in different tissues of geotropically stimulated maize root apices  
A78-52631

Controlled cellular energy conversion in brown adipose tissue thermogenesis  
A78-52698

Volume-restricted freezing of living cells and tissues  
[ORNL/MIT-265]  
N78-33705

Physical mechanisms for biological effects of ultrasound  
[PB-282234/4]  
N78-33725

Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems  
N78-33728

**CENTRAL NERVOUS SYSTEM**

The effect of various drugs on experimentally induced ulcers in immobilized rats  
[NASA-TM-75340]  
N78-32670

**CENTRIFUGING STRESS**

Effects of fracture trauma, estrone treatment, and a 2-G environment on the epiphyseal cartilage zones of developing avian radii  
A78-52643

Configuration of the chest wall during increased gravitational stress in erect humans  
A78-53709

**CEREBELLUM**

Changes in electroscerebellograms and autonomic reactions of rats to accelerations  
N78-32684

**CEREBRUM**

Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism  
N78-32687

**CHEMICAL ANALYSIS**

Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2  
[AD-A056312]  
N78-33719

**CHEMICAL EVOLUTION**

Chemical evolution and the origin of life - Bibliography supplement 1976  
A78-53875

**CHEMICAL TESTS**

Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 1  
[AD-A056311]  
N78-33718

**CHEMILUMINESCENCE**

Biological water quality monitoring using chemiluminescent and bioluminescent techniques  
[NASA-CR-156830]  
N78-33702

**CHEMORECEPTORS**

Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Role of carotid chemoreceptors  
A78-52542

**CHEST**

Configuration of the chest wall during increased gravitational stress in erect humans  
A78-53709

**CINEMATOGRAPHY**

A microcinematographic method of studying the rate of circulation in the brain capillaries  
A78-52400

**CIRCADIAN RHYTHMS**

Circadian rhythm dissociation in an environment with conflicting temporal information  
A78-52699

Role of the paradoxical phase in the organization of the sleep-wakefulness cycle in the rat  
A78-53786

**CLINICAL MEDICINE**

Bleeding duodenal ulcer and the flier  
A78-52646

**COCHLEA**

Bleeding into inner ears of chinchillas caused by simulated sonic boom  
A78-51847

Functional evidence of efferent nerve endings in the human inner ear  
A78-53393

A rheological model for research on cochlear hypoxia  
A78-53394

The importance of the perilymphatic oxygen supply in the cochlea function  
A78-53395

A scanning study of acoustic lesions of the cochlea  
A78-53397

An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla  
A78-53398

**COGNITION**

An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
[AD-A057113]  
N78-33733

**COLD WATER**

Effect of the combination of dry air heat and cold water treatment on human orthostatic stability  
N78-32695

**COLOR VISION**

Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation  
A78-51871

Binocular interactions during establishment of McCollough effects --- color aftereffects  
A78-51955

Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells  
A78-52444

GOI anomaloscopes used to set standards for color vision of flight personnel  
N78-32688

## COMFORT

Aeromedical implications of the X-Chrom lens for improving color vision deficiencies [AD-A054794] N78-32708

**COMFORT**  
Effect of vibration duration on human discomfort --- passenger comfort and random vibration [NASA-TP-1283] N78-32717

**COMMAND AND CONTROL**  
Biocybernetics experiment: Command and control human factors experimental program [AD-A055666] N78-32710

**COMMUNICATION NETWORKS**  
Design of a system of man-computer communication A78-51640

**COMPENSATORY TRACKING**  
Unimanual and bimanual control in a compensatory tracking task A78-51347

**COMPUTER GRAPHICS**  
Computer display and manipulation of biological molecules A78-53400  
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation [AD-A056116] N78-33742

**COMPUTER TECHNIQUES**  
Computer implemented grading of flight simulator students [AIAA 78-1589] A78-50665  
Quantitative organ visualization N78-33708

**COMPUTERIZED SIMULATION**  
Adaptation of time line analysis program to single pilot instrument flight research [NASA-TN-78748] N78-33731

**CONFERENCES**  
Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers A78-50651  
Inner ear biology; Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977 A78-53391

**CONTACT LENSES**  
Aeromedical implications of the X-Chrom lens for improving color vision deficiencies [AD-A054794] N78-32708

**CONTROL EQUIPMENT**  
Pneumatic inflatable end effector [NASA-CASE-MFS-23696-1] N78-32724

**CONTROL SIMULATION**  
Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation --- German thesis A78-52497

**CONTROL THEORY**  
Optimal control theory applied to the design of cue shaping filters for motion-base simulators [AIAA 78-1575] A78-50656

**COOLING SYSTEMS**  
Cooling system for removing metabolic heat from an hermetically sealed spacesuit [NASA-CASE-ARC-11059-1] N78-32721

**CORIOLIS EFFECT**  
Effect of coriolis accelerations on man's ability to determine the direction of gravitational vertical N78-32694

**CORN**  
Regions of differential cell elongation and mitosis, and root meristem morphology in different tissues of geotropically stimulated maize root apices A78-52631

**CORONARY CIRCULATION**  
Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming A78-51299

**CORTI ORGAN**  
Fine morphology of the tectorial membrane - Fresh and developmental A78-53392  
A scanning study of acoustic lesions of the cochlea A78-53397

## SUBJECT INDEX

**COSMONAUTS**  
Space biology and aerospace medicine, no. 4 [JPRS-71830] N78-32672  
Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates N78-32674  
Polish cosmonaut selection process described N78-33033

**CRITICAL FLICKER FUSION**  
Visual stimulator --- for critical flicker fusion experiments A78-52704

**CRYOGENICS**  
Cryobiology. A bibliography with abstracts [NTIS/PS-78/0678/9] N78-33707

**CUES**  
Emulation of an advanced G-seat on the advanced simulator for pilot training [AD-A055532] N78-33741

**CYBERNETICS**  
Biocybernetics experiment: Command and control human factors experimental program [AD-A055666] N78-32710

**CYTOPLASM**  
Effects of altered gravity on viscosity of cytoplasm and protein content of plant cells N78-32691

**D**

**DARK ADAPTATION**  
Studies on the light and dark adaptation system in the retina A78-51873

**DATA COMPRESSION**  
Real-time compression of ECG data - Technical realization A78-51459

**DECOMPRESSION SICKNESS**  
Gas elimination during a single-stage decompression A78-52637  
Movement by helicopter of patients with decompression sickness A78-52645

**DECONGESTANTS**  
The effects of altitude and two decongestant-antihistamine preparations on physiological functions and performance [AD-A054793] N78-32706  
Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, +Gz, and fatigue tolerances --- pilot performance [AD-A055089] N78-32707

**DIGESTIVE SYSTEM**  
Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite N78-32681

**DIGITAL SIMULATION**  
Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction [AIAA 78-1592] A78-50667

**DISORIENTATION**  
Effect of coriolis accelerations on man's ability to determine the direction of gravitational vertical N78-32694

**DISPLAY DEVICES**  
Human-factors optimization of displays and control units for pilot and copilot A78-50267  
Depth perception and motion cues via textured scenes --- in flight simulators A78-50658 [AIAA 78-1577]  
Computer display and manipulation of biological molecules A78-53400  
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation [AD-A056116] N78-33742

**DIURESIS**  
Electrolyte content of the myocardium, skeletal muscles and blood of rats during prolonged hypokinesia and readaptation N78-32692

## DOSIMETERS

Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite  
N78-32680

## DRUGS

The effect of various drugs on experimentally induced ulcers in immobilized rats  
[NASA-TM-75340] N78-32670

## DRY HEAT

Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
A78-53874  
Effect of the combination of dry air heat and cold water treatment on human orthostatic stability  
N78-32695

## DUMMIES

Fast neutron depth dose distributions in a heterogeneous phantom  
N78-33712  
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977  
[AD-A056905] N78-33737

## DYNAMIC MODELS

Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction  
[AIAA 78-1592] A78-50667

## E

## EAR

The role of a decrease in body heat content in the thermoregulatory response of ear passageways  
A78-51661  
Use of the auricle-floor temperature of the rabbit as an index of skin blood flow  
A78-53792

## EARTH SURFACE

Formation of early earth regolith --- origins of life  
A78-50277

## ECCENTRICITY

The interaction between the utricles and the semicircular canals during eccentric rotation  
N78-33714

## EDUCATION

Use of path models to study a precareer air traffic control training program  
A78-52641

## EFFECTIVE PERCEIVED NOISE LEVELS

Auditory frequency selectivity and two-tone suppression in normal hearing human listeners  
N78-32697  
The effort of noise exposure on the masking level difference  
N78-33709

## EFFERENT NERVOUS SYSTEMS

Functional evidence of efferent nerve endings in the human inner ear  
A78-53393

## ELASTIC SHELLS

Small oscillations of an ideal fluid with consideration of mass forces in the elastic shell  
A78-51386

## ELECTRIC CONDUCTORS

A subcutaneous channeling probe for implanting long leads  
A78-51872

## ELECTRIC FIELDS

Biological effects of high strength electric fields on small laboratory animals  
[HCP/T1830-03] N78-33706

## ELECTRIC POWER TRANSMISSION

Electrical and biological effects of transmission lines: A review  
[BPA-BIO-77-1] N78-33722

## ELECTRIC STIMULI

REM deprivation by stimulation of the reticular formation in the rat  
A78-53787

## ELECTRICAL IMPEDANCE

Impedance cardiography for estimating cardiac output during submaximal and maximal work  
A78-52544

## ELECTROCARDIOGRAPHY

Real-time compression of ECG data - Technical realization  
A78-51459

## ELECTROENCEPHALOGRAPHY

Workload and fatigue-in-flight EEG changes  
A78-52640  
Changes in electrocerebellograms and autonomic reactions of rats to accelerations  
N78-32684  
Biocybernetics experiment: Command and control human factors experimental program  
[AD-A055666] N78-32710  
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain  
N78-33701

## ELECTROLYTE METABOLISM

Electrolyte content of the myocardium, skeletal muscles and blood of rats during prolonged hypokinesia and readaption  
N78-32692

## ELECTROMAGNETIC FIELDS

Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation  
[JPRS-71910] N78-33727  
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems  
N78-33728

## ELECTRON MICROSCOPY

A scanning study of acoustic lesions of the cochlea  
A78-53397  
I-ray analysis of biological specimens  
[UR-3490-1341] N78-33704

## ELECTRON TRANSFER

Biophysics of photosynthesis  
A78-53848

## ELECTRONYSTAGMOGRAPHY

A procedure for the automated analysis of vestibular nystagmus  
A78-50750  
The interaction between the utricles and the semicircular canals during eccentric rotation  
N78-33714

## EMERGENCY LIFE SUSTAINING SYSTEMS

Movement by helicopter of patients with decompression sickness  
A78-52645

## ENDOLYMPH

Some findings on the inner ear after experimental obliteration of the endolymphatic duct and sac of guinea pigs  
A78-53396

## ENERGY CONVERSION

Controlled cellular energy conversion in brown adipose tissue thermogenesis  
A78-52698

## ENERGY CONVERSION EFFICIENCY

Biophysics of photosynthesis  
A78-53848

## ENERGY TRANSFER

Biophysics of photosynthesis  
A78-53848

## ENVIRONMENT SIMULATION

Response of terrestrial microorganisms to a simulated Martian environment  
A78-53624

## ENVIRONMENTAL CONTROL

Spacelab life support and habitability systems growth for extended mission durations  
[AIAA PAPER 78-1672] A78-51997

## ENZYME ACTIVITY

Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism  
N78-32687

## ENZYMES

Aminoacyl-tRNA synthetase families and their significance to the origin of the Genetic Code  
A78-53873

## EPINEPHRINE

Experimental attempts to evoke a differential response to different stressors  
[AD-A054795] N78-32716



# ERROR ANALYSIS

# SUBJECT INDEX

## ERROR ANALYSIS

Real-time compression of ECG data - Technical realization

A78-51459

## ERYTHROCYTES

Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia

A78-53788

## ESTROGENS

Effects of fracture trauma, estrone treatment, and a 2-G environment on the epiphyseal cartilage zones of developing avian radii

A78-52643

## EUROPEAN SPACE PROGRAMS

Medical and psychological selection and training criteria for European SL-payload specialists [AAS PAPER 78-028]

A78-53608

## EXHAUSTION

Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise

A78-52545

## EXOBIOLOGY

Life beyond the earth

N78-32136

Space biology and aerospace medicine, no. 4

[JPRS-71830]

N78-32672

Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite

N78-32681

## EXPERIMENTAL DESIGN

Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite

N78-32680

Design, analysis, and interpretation of screening studies for human factors engineering research, revision

[AD-A056985]

N78-33743

## EXPERIMENTATION

Biological experiments on board Salyut-6

N78-34032

## EXTRATERRESTRIAL LIFE

Life beyond the earth

N78-32136

## EXTRAVEHICULAR ACTIVITY

Manned maneuvering unit - A space platform support system

[AIAA PAPER 78-1663]

A78-51990

## EYE (ANATOMY)

A procedure for the automated analysis of vestibular nystagmus

A78-50750

## EYE MOVEMENTS

Egocentric orientation is influenced by trained voluntary cyclorotary eye movements

A78-51856

Smooth eye tracking and the perception of motion in the absence of real movement

A78-51951

The effect of luminance on human smooth pursuit of perifoveal and foveal targets

A78-51952

# F

## FACE (ANATOMY)

Three-dimensional anthropometry of the adult face --- bioengineering for protective breathing equipment

[AD-A054938]

N78-32705

## FACTOR ANALYSIS

Design, analysis, and interpretation of screening studies for human factors engineering research, revision

[AD-A056985]

N78-33743

## FAST NEUTRONS

Fast neutron depth dose distributions in a heterogeneous phantom

N78-33712

## FATIGUE (BIOLOGY)

Metabolic structure of the recovery process following various physical stresses

A78-53791

## FEEDBACK CONTROL

Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction

[AIAA 78-1592]

A78-50667

Time delays in flight simulators - Behavioral and engineering analyses

[AIAA 78-1596]

A78-50670

Prediction, evaluation, and specification of closed loop and multiaxis flying qualities

[AD-A056983]

N78-33736

## FEMALES

The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success

[AD-A055009]

N78-32722

Pull force capabilities for parachute ripcord release

[MEMO-33]

N78-32723

## FIGHTER AIRCRAFT

Development and validation of drive concepts for an advanced G-cuing system --- fighter/attack aircraft flying training simulators

[AIAA 78-1571]

A78-50652

Development of the Advanced G Cuing System --- tactical flight simulators

[AIAA 78-1572]

A78-50653

Platform motion for fighter simulations --- flight training simulators

[AIAA 78-1574]

A78-50655

## FINE STRUCTURE

Fine morphology of the tectorial membrane - Fresh and developmental

A78-53392

Some findings on the inner ear after experimental obliteration of the endolymphatic duct and sac of guinea pigs

A78-53396

## FLASH BLINDNESS

Psychophysiological distinctions of pilot performance during brief exposure to intensive photic stimuli

N78-32678

## FLIGHT CONDITIONS

A review of human factors engineering studies at Aeromedical Laboratory

A78-51498

## FLIGHT CONTROL

Accurately reproducing pilot's control forces in a flight simulator

[AIAA 78-1585]

A78-50663

## FLIGHT CREWS

Heat transfer principles in personal protection applications

A78-51222

Bleeding duodenal ulcer and the flier

A78-52646

Air Force aircrew training devices: Master plan

[AD-A056940]

N78-33734

## FLIGHT FATIGUE

Workload and fatigue-in-flight EEG changes

A78-52640

## FLIGHT SAFETY

Reviews on research and development with respect to the life support equipments in JASDF and its perspectives

A78-51499

U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75

A78-52644

## FLIGHT SIMULATION

Flight Simulation Technologies Conference, Arlington, Tex., September 18-20, 1978, Technical Papers

A78-50651

Platform motion for fighter simulations --- flight training simulators

[AIAA 78-1574]

A78-50655

Verification of workload - A job for simulation --- pilot performance

[AIAA 78-1586]

A78-50664

Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation --- German thesis

A78-52497

Prediction, evaluation, and specification of closed loop and multiaxis flying qualities

[AD-A056983]

N78-33736

Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation  
[AD-A056116] N78-33742

**FLIGHT SIMULATORS**  
Development of the Advanced G Cuing System --- tactical flight simulators  
[AIAA 78-1572] A78-50653  
The effect of helmet loader G-cueing on pilot's simulator performance  
[AIAA 78-1573] A78-50654  
Optimal control theory applied to the design of cue shaping filters for motion-base simulators  
[AIAA 78-1575] A78-50656  
Motion - Methods and requirements --- flight training simulators  
[AIAA 78-1576] A78-50557  
Depth perception and motion cues via textured scenes --- in flight simulators  
[AIAA 78-1577] A78-50658  
Accurately reproducing pilot's control forces in a flight simulator  
[AIAA 78-1585] A78-50663  
Computer implemented grading of flight simulator students  
[AIAA 78-1589] A78-50665  
Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction  
[AIAA 78-1592] A78-50667  
A model for the pilot's use of motion cues in steady-state roll-axis tracking tasks  
[AIAA 78-1593] A78-50668  
Time delays in flight simulators - Behavioral and engineering analyses  
[AIAA 78-1596] A78-50670  
Area of interest/field-of-view research using ASPT --- flight helmets for pilot and gunnery trainers  
[AD-A055692] N78-32718  
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator  
[AD-A055691] N78-33739  
G-seat component development  
[AD-A055533] N78-33740  
Emulation of an advanced G-seat on the advanced simulator for pilot training  
[AD-A055532] N78-33741

**FLIGHT TRAINING**  
Computer implemented grading of flight simulator students  
[AIAA 78-1589] A78-50665  
A unique approach to aerial refueling simulation for training boom operators  
[AIAA 78-1591] A78-50666  
Autogenic training in a practical course of summer instruction of student pilots  
A78-52275  
Area of interest/field-of-view research using ASPT --- flight helmets for pilot and gunnery trainers  
[AD-A055692] N78-32718  
Air Force aircrew training devices: Master plan  
[AD-A056940] N78-33734

**FLYING PERSONNEL**  
GOI anemoscopes used to set standards for color vision of flight personnel  
N78-32688

**FOOD INTAKE**  
Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538

**FOURIER ANALYSIS**  
Texture discrimination and Fourier analysis in human vision  
A78-53865

**FOVEA**  
The effect of luminance on human smooth pursuit of perifoveal and foveal targets  
A78-51952  
How presaccadic gratings modify postsaccadic modulation transfer function  
A78-51953

**FREEZING**  
Volume-restricted freezing of living cells and tissues  
[ORNL/MT-265] N78-33705

**FREQUENCIES**

Auditory frequency selectivity and two-tone suppression in normal hearing human listeners  
N78-32697

**FUEL OILS**

A literature review: Problem definition studies on selected toxic chemicals. Volume 4: Occupational health and safety aspects of the fog oils SGP No. 1 and SGP No. 2 and smoke screens generated from them  
[AD-A055903] N78-32709

**G****GAMMA RAYS**

Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
A78-53874

**GAS EXCHANGE**

Gas elimination during a single-stage decompression  
A78-52637  
Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude  
A78-53711

**GASEOUS DIFFUSION**

Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude  
A78-53711

**GENERAL AVIATION AIRCRAFT**

U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75  
A78-52644

**GENETIC CODE**

Aminoacyl-tRNA synthetase families and their significance to the origin of the Genetic Code  
A78-53873

**GENETICS**

Multinational Andean Genetic and Health Program. VII - Lung function and physical growth - Multivariate analyses in high- and low-altitude populations  
A78-52639

**GEOTROPISM**

Present status of the problem concerning the detection of gravity by plants  
A78-50998  
Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity  
A78-51394  
Regions of differential cell elongation and mitosis, and root meristem morphology in different tissues of geotropically stimulated maize root apices  
A78-52631

**GLYCOLYSIS**

Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia  
A78-51662

**GONADS**

Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system  
[PNL-2634] N78-33720

**GRATINGS (SPECTRA)**

How presaccadic gratings modify postsaccadic modulation transfer function  
A78-51953  
Contrast sensitivity during saccadic eye movements  
A78-51954

**GRAVITATION**

Present status of the problem concerning the detection of gravity by plants  
A78-50998

**GRAVITATIONAL EFFECTS**

Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity  
A78-51394  
Mental rotation under head tilt - Factors influencing the location of the subjective reference frame  
A78-53084  
Tachistoscopic perception under head tilt  
A78-53085  
Configuration of the chest wall during increased gravitational stress in erect humans  
A78-53709

## GROWTH

Effects of altered gravity on viscosity of cytoplasm and protein content of plant cells  
N78-32691

## GROWTH

Multinational Andean Genetic and Health Program.  
VII - Lung function and physical growth -  
Multivariate analyses in high- and low-altitude populations  
A78-52639  
Effects of fracture trauma, estrone treatment, and a 2-G environment on the epiphyseal cartilage zones of developing avian radii  
A78-52643

## GUNNERY TRAINING

Area of interest/field-of-view research using ASPT --- flight helmets for pilot and gunnery trainers [AD-A055692]  
N78-32718

## H

## HABITABILITY

Spacelab life support and habitability systems growth for extended mission durations [AIAA PAPER 78-1672]  
A78-51997

## HALOPHILES

The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by Halobacterium saccharovorum  
A78-53619

## HEALING

Effects of fracture trauma, estrone treatment, and a 2-G environment on the epiphyseal cartilage zones of developing avian radii  
A78-52643

## HEALTH PHYSICS

Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements [LA-UR-78-1063]  
N78-33721

## HEARING

Auditory frequency selectivity and two-tone suppression in normal hearing human listeners  
N78-32697

## HEART

Development of radiation lesions to the rat heart during a space flight (experimental morphological study)  
N78-32690

## HEART DISEASES

U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75  
A78-52644

## HEART FUNCTION

Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
A78-50531  
Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299  
Effect of hypokinesia on the contractile function and neural regulation of the heart  
A78-53789

## HEART RATE

Impedance cardiography for estimating cardiac output during submaximal and maximal work  
A78-52544

## HEAT ACCLIMATIZATION

The correlation of sodium and potassium metabolism with the level of energy consumption in man during adaptation to heat [NASA-TM-75331]  
N78-32704

## HEAT SOURCES

Controlled cellular energy conversion in brown adipose tissue thermogenesis  
A78-52698

## HEAT TRANSFER

Heat transfer principles in personal protection applications  
A78-51222

## HELICOPTER PERFORMANCE

Movement by helicopter of patients with decompression sickness  
A78-52645

## SUBJECT INDEX

## HELICOPTERS

Visual performance/workload of helicopter pilots during instrument flight [AD-A055424]  
N78-33738

## HELMETS

The effect of helmet loader G-cueing on pilot's simulator performance [AIAA 78-1573]  
A78-50654  
Area of interest/field-of-view research using ASPT --- flight helmets for pilot and gunnery trainers [AD-A055692]  
N78-32718  
Program documentation for the terrain and flight dynamics program --- computer graphics for flight simulation [AD-A056116]  
N78-33742

## HEMATOLOGY

Biological effects of high strength electric fields on small laboratory animals [HCP/T1830-03]  
N78-33706

## HEMODYNAMIC RESPONSES

Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299

Impedance cardiography for estimating cardiac output during submaximal and maximal work  
A78-52544

Morphological study of hemopoietic organs of hypokinetic rats  
N78-32686

Relationship between osmotic pressure of the blood and secretion of sweat [NASA-TM-75461]  
N78-33703

## HEMODYNAMICS

A microcinematographic method of studying the rate of circulation in the brain capillaries  
A78-52400

Plasma volume changes with movement to supine and standing positions  
A78-52541

Use of the auricle-floor temperature of the rabbit as an index of skin blood flow  
A78-53792

## HEMORRHAGES

Bleeding duodenal ulcer and the flier  
A78-52646

## HERMETIC SEALS

Cooling system for removing metabolic heat from an hermetically sealed spacesuit [NASA-CASE-ARC-11059-1]  
N78-32721

## HIGH ALTITUDE

Altitude hypoxia. A bibliography with abstracts [NTIS/PS-78/0443]  
N78-32711

## HIGH ALTITUDE BREATHING

Physical fitness of permanent lowland and highland residents  
N78-32679

## HIGH ALTITUDE ENVIRONMENTS

Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299

Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537

Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538

## HIGH PRESSURE

Hyperbaric oxygenation. A bibliography with abstracts [NTIS/PS-78/0676/3]  
N78-33724

## HISTAMINES

Endogenous histamine and promethazine-induced gastric ulcers in the guinea pig [NASA-TM-75341]  
N78-32668

## HISTOCHEMICAL ANALYSIS

Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite  
N78-32681

## HISTOLOGY

Fine morphology of the tectorial membrane - Fresh and developmental  
A78-53392

- An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla  
A78-53398
- HISTORIES**  
Life beyond the earth  
N78-32136
- HOMEOSTASIS**  
Inhibition of bone formation during space flight  
A78-51225
- HORMONE METABOLISMS**  
Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538
- HUMAN BEINGS**  
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system  
[AD-A055706]  
N78-33732
- HUMAN BODY**  
Kaliuretic renal function in man as related to different degrees of exercise during bedrest  
N78-32675  
Evaluation of regional blood filling by means of rheoplethysmography combined with functional tests  
N78-32676  
Dynamics of free amino acid levels in human blood plasma during bed rest in head down position  
N78-32677  
Physical fitness of permanent lowland and highland residents  
N78-32679  
Effect of the combination of dry air heat and cold water treatment on human orthostatic stability  
N78-32695  
Three-dimensional anthropometry of the adult face --- bioengineering for protective breathing equipment  
[AD-A054938]  
N78-32705  
Fast neutron depth dose distributions in a heterogeneous phantom  
N78-33712  
The combined effect of an SHF field and an unfavorable microclimate on the body  
N78-33730
- HUMAN FACTORS ENGINEERING**  
Human-factors optimization of displays and control units for pilot and copilot  
A78-50267  
Verification of workload - A job for simulation --- pilot performance  
[AIAA 78-1586]  
A78-50664  
Heat transfer principles in personal protection applications  
A78-51222  
A review of human factors engineering studies at Aeromedical Laboratory  
A78-51498  
Reviews on research and development with respect to the life support equipments in JASDF and its perspectives  
A78-51499  
Effect of vibration duration on human discomfort --- passenger comfort and random vibration  
[NASA-TP-1283]  
N78-32717  
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts  
[NTIS/PS-78/0866/0]  
N78-33726  
Adaptation of time line analysis program to single pilot instrument flight research  
[NASA-TM-78748]  
N78-33731  
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator  
[AD-A055691]  
N78-33739  
Design, analysis, and interpretation of screening studies for human factors engineering research, revision  
[AD-A056985]  
N78-33743
- HUMAN FACTORS LABORATORIES**  
A review of human factors engineering studies at Aeromedical Laboratory  
A78-51498
- HUMAN PATHOLOGY**  
The relationship between stress-related metabolites and disqualifying pathology in air traffic control personnel  
N78-32702
- HUMAN PERFORMANCE**  
Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work  
A78-52638  
Binocular detection by normal and stereoblind observers  
A78-53082  
Effect of coriolis accelerations on man's ability to determine the direction of gravitational vertical  
N78-32694  
The effects of altitude and two decongestant-antihistamine preparations on physiological functions and performance  
[AD-A054793]  
N78-32706  
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator  
[AD-A055691]  
N78-33739
- HUMAN REACTIONS**  
Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres  
A78-51348  
The effect of sound duration on annoyance  
A78-51841  
Auditory frequency selectivity and two-tone suppression in normal hearing human listeners  
N78-32697  
Three reports relevant to stress in aviation personnel  
[AD-A051690]  
N78-32699  
Experimental attempts to evoke a differential response to different stressors  
[AD-A054795]  
N78-32716  
The interaction between the utricles and the semicircular canals during eccentric rotation  
N78-33714
- HUMAN TOLERANCES**  
Effect of vibration duration on human discomfort --- passenger comfort and random vibration  
[NASA-TP-1283]  
N78-32717  
Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements  
[LA-UR-78-1063]  
N78-33721  
Effects of nitrogen dioxide on pulmonary function in human subjects  
[PB-281186/7]  
N78-33723
- HYDRAULICS**  
Fifty minute in hydraulic weightlessness  
N78-33018
- HYDROCARBON POISONING**  
Toxicity of gaseous halogenated organic compounds. A bibliography with abstracts  
[NTIS/PS-78/0600/3]  
N78-32712
- HYPERCAPNIA**  
Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia  
A78-51662  
Criteria for quantitative evaluation of respiratory system responses  
A78-53790
- HYPEROXIA**  
Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism  
N78-32687  
Hyperbaric oxygenation. A bibliography with abstracts  
[NTIS/PS-78/0676/3]  
N78-33724
- HYPERVENTILATION**  
Oxygen consumption during constant-load exercise  
A78-52540
- HYPOKINESIA**  
Effect of hypokinesia on the contractile function and neural regulation of the heart  
A78-53789  
Morphological study of hemopoietic organs of hypokinetic rats  
N78-32686  
Effects of weightlessness and hypokinesia on contractility of bundles of glycerin-treat rat muscle fibers  
N78-32689

## HYPOTHERMIA

- Electrolyte content of the myocardium, skeletal muscles and blood of rats during prolonged hypokinesia and readaption  
N78-32692
- Dynamics of afferent impulsation in posterior spinal radices of dogs with restricted movement  
N78-32696

## HYPOTHERMIA

- Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia  
A78-51662

## HYPOXIA

- Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299
  - Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia  
A78-51662
  - A rheological model for research on cochlear hypoxia  
A78-53394
  - Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia  
A78-53788
  - Distinctions of radioprotective effect of acute hypoxia on 5-day-old mice preadapted to oxygen deficiency  
N78-32683
  - Altitude hypoxia. A bibliography with abstracts [NTIS/PS-78/0443]  
N78-32711
- ## HYSTERESIS
- Hysteresis in human binocular fusion: A second look  
N78-33711

## I

## IDEAL FLUIDS

- Small oscillations of an ideal fluid with consideration of mass forces in the elastic shell  
A78-51386

## ILLUSIONS

- Egocentric orientation is influenced by trained voluntary cyclorotary eye movements  
A78-51856
- Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system  
[AD-A055706]  
N78-33732

## IMAGE CONTRAST

- Contrast sensitivity during saccadic eye movements  
A78-51954
- Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast  
A78-51956

## IMAGE ENHANCEMENT

- Aeromedical implications of the X-Chrom lens for improving color vision deficiencies  
[AD-A054794]  
N78-32708

## IMPLANTATION

- A subcutaneous channeling probe for implanting long leads  
A78-51872

## IN-FLIGHT MONITORING

- Workload and fatigue-in-flight EEG changes  
A78-52640

## INDUSTRIAL SAFETY

- Air pollution assessment of vinylidene chloride  
[PB-280624/8]  
N78-32714

## INFRARED LASERS

- Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses  
A78-51078

## INSPIRATION

- Breathing pattern in men during inspiratory elastic loads  
A78-53712

## INSTRUMENT FLIGHT RULES

- Adaptation of time line analysis program to single pilot instrument flight research  
[NASA-TN-78748]  
N78-33731
- Visual performance/workload of helicopter pilots during instrument flight  
[AD-A055424]  
N78-33738

## SUBJECT INDEX

## INSTRUMENT LANDING SYSTEMS

- Contributions regarding work load measurement and learning behavior in simulated STOL approaches  
--- German book  
A78-52499

## INTERVERTEBRAL DISKS

- The lumbosacral segment as a vulnerable region in various postures  
[NASA-TN-75579]  
N78-33713

## IONIZING RADIATION

- Distinctions of radioprotective effect of acute hypoxia on 5-day-old mice preadapted to oxygen deficiency  
N78-32683

- The preventive role of ultraviolet radiation during exposure to ionizing radiation  
[NASA-TN-75106]  
N78-33710

## IRON COMPOUNDS

- Research and development of a luminol-carbon monoxide flow system  
[NASA-CR-156832]  
N78-32671

## IRRADIATION

- Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite  
N78-32680

## K

## KIDNEYS

- Kalluretic renal function in man as related to different degrees of exercise during bedrest  
N78-32675

## L

## LABYRINTH

- Inner ear biology; Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977  
A78-53391

## LACTOSE

- The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by Halobacterium saccharovorum  
A78-53619

## LANDING SIMULATION

- Contributions regarding work load measurement and learning behavior in simulated STOL approaches  
--- German book  
A78-52499

## LARGE SPACE STRUCTURES

- Manned maneuvering unit - A space platform support system  
[AIAA PAPER 78-1663]  
A78-51990

## LASER DAMAGE

- Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses  
A78-51078

## LATERAL CONTROL

- A model for the pilot's use of motion cues in steady-state roll-axis tracking tasks  
[AIAA 78-1593]  
A78-50668

## LIFE SUPPORT SYSTEMS

- Reviews on research and development with respect to the life support equipments in JASDF and its perspectives  
A78-51499

- Spacelab life support and habitability systems growth for extended mission durations  
[AIAA PAPER 78-1672]  
A78-51997

- Cooling system for removing metabolic heat from an hermetically sealed spacesuit  
[NASA-CASE-ARC-11059-1]  
N78-32721

- Development of modern spacesuits  
N78-33034

## LIGHT ADAPTATION

- Studies on the light and dark adaptation system in the retina  
A78-51873

## LIPID METABOLISM

- Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness  
A78-51300

**LIQUID FILLED SHELLS**

Small oscillations of an ideal fluid with  
consideration of mass forces in the elastic shell  
A78-51386

**LITERATURE**

Formation and management of an expert  
toxicological review team for literature search,  
evaluation and organization of currently  
available rapid toxicological tests, volume 1  
[AD-A056311] N78-33718

Formation and management of an expert  
toxicological review team for literature search,  
evaluation and organization of currently  
available rapid toxicological tests, volume 2  
[AD-A056312] N78-33719

**LIVER**

On the possible role of lysosomal proteinases in  
the biological effects of accelerations  
N78-32685

**LONG TERM EFFECTS**

Kaliuretic renal function in man as related to  
different degrees of exercise during bedrest  
N78-32675

Investigation of the influence of prolonged  
rotation on radiation lesions  
N78-32682

Morphological study of hemopoietic organs of  
hypokinetic rats  
N78-32686

Effects of weightlessness and hypokinesia on  
contractility of bundles of glycerin-treat rat  
muscle fibers  
N78-32689

Electrolyte content of the myocardium, skeletal  
muscles and blood of rats during prolonged  
hypokinesia and readaption  
N78-32692

**LUBRICATING OILS**

A literature review: Problem definition studies  
on selected toxic chemicals. Volume 4:  
Occupational health and safety aspects of the  
fog oils SGF No. 1 and SGF No. 2 and smoke  
screens generated from them  
[AD-A055903] N78-32709

**LUMBAR REGION**

The lumbosacral segment as a vulnerable region in  
various postures  
[NASA-TM-75579] N78-33713

**LUMINANCE**

The effect of luminance on human smooth pursuit of  
perifoveal and foveal targets  
A78-51952

A facilitation effect in orientation discrimination  
--- relation to visual stimulus onset asynchrony  
A78-51957

**LUMINOSITY**

Research and development of a luminol-carbon  
monoxide flow system  
[NASA-CR-156832] N78-32671

**LUNG MORPHOLOGY**

Multinational Andean Genetic and Health Program.  
VII - Lung function and physical growth -  
Multivariate analyses in high- and low-altitude  
populations  
A78-52639

Configuration of the chest wall during increased  
gravitational stress in erect humans  
A78-53709

**LYMPH**

The importance of the perilymphatic oxygen supply  
in the cochlea function  
A78-53395

**LYSOZYME**

On the possible role of lysosomal proteinases in  
the biological effects of accelerations  
N78-32685

**M****MAMMALS**

The scaling of maximal oxygen consumption and  
pulmonary dimensions in small mammals  
A78-53710

**MAN MACHINE SYSTEMS**

Human-factors optimization of displays and control  
units for pilot and copilot  
A78-50267

A model for the pilot's use of motion cues in  
steady-state roll-axis tracking tasks  
[AIAA 78-1593] A78-50668

Time delays in flight simulators - Behavioral and  
engineering analyses  
[AIAA 78-1596] A78-50670

A review of human factors engineering studies at  
Aeromedical Laboratory  
A78-51498

Reviews on research and development with respect  
to the life support equipments in JASDF and its  
perspectives  
A78-51499

Design of a system of man-computer communication  
A78-51640

Contributions regarding work load measurement and  
learning behavior in simulated STOL approaches  
--- German book  
A78-52499

Biocybernetics experiment: Command and control  
human factors experimental program  
[AD-A055666] N78-32710

An annotated bibliography of the literature  
dealing with the physiological correlates of  
cognitive performance  
[AD-A057113] N78-33733

**MANAGEMENT PLANNING**

Air Force aircrew training devices: Master plan  
[AD-A056940] N78-33734

**MANIPULATORS**

Pneumatic inflatable end effector  
[NASA-CASE-MFS-23696-1] N78-32724

**MANNEVED ORBITAL RESEARCH LABORATORIES**

Life sciences laboratories in Spacelab  
[AAS PAPER 78-011] A78-53613

The NASA Life Sciences experiment program for  
Shuttle/Spacelab  
[AAS PAPER 78-010] A78-53615

Biological experiments on board Salyut-6  
N78-34032

**MANNEVED SPACE FLIGHT**

Medical and psychological selection and training  
criteria for European SL-payload specialists  
[AAS PAPER 78-028] A78-53608

**MANUAL CONTROL**

Time delays in flight simulators - Behavioral and  
engineering analyses  
[AIAA 78-1596] A78-50670

Unimaneval and bimaneval control in a compensatory  
tracking task  
A78-51347

**MARS (PLANET)**

Response of terrestrial microorganisms to a  
simulated Martian environment  
A78-53624

**MARS SURFACE**

Photocatalytic oxidation of organic compounds on  
Mars  
A78-51137

**MASKING**

The effort of noise exposure on the masking level  
difference  
N78-33709

**MEASURING INSTRUMENTS**

Condition sensor system and method  
[NASA-CASE-MSC-14805-1] N78-32720

**MECHANICAL PROPERTIES**

Effect of age on mechanical properties and  
biochemical composition of the heart arteries in  
man  
A78-50531

**MEDICAL ELECTRONICS**

Real-time compression of ECG data - Technical  
realization  
A78-51459

**MEDICAL EQUIPMENT**

Fast neutron depth dose distributions in a  
heterogeneous phantom  
N78-33712

Optical probe --- a rectal probe  
[NASA-CASE-NPO-14247-1] N78-33715

**MEMBRANES**

Fine morphology of the tectorial membrane - Fresh  
and developmental  
A78-53392

**MEMORY**

The consolidation process and some of its  
neurochemical mechanisms  
A78-51318

# MENTAL PERFORMANCE

# SUBJECT INDEX

## MENTAL PERFORMANCE

Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work

A78-52638

Mental rotation under head tilt - Factors influencing the location of the subjective reference frame

A78-53084

An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance

[AD-A057113] N78-33733

## METABOLIC DISEASES

The relationship between stress-related metabolites and disqualifying pathology in air traffic control personnel

N78-32702

## METABOLIC WASTES

Cooling system for removing metabolic heat from an hermetically sealed spacesuit

[NASA-CASE-ARC-11059-1] N78-32721

## METABOLISM

Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man

A78-52537

Metabolic structure of the recovery process following various physical stresses

A78-53791

The correlation of sodium and potassium metabolism with the level of energy consumption in man during adaptation to heat

[NASA-TN-75331] N78-32704

## METALS

Annotated bibliography on biological effects of metals in aquatic environments, 3d

[PB-280953/1] N78-32715

## MICE

Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice

[NASA-CASE-ARC-11114-1] N78-33717

## MICROCLIMATOLOGY

The combined effect of an SHP field and an unfavorable microclimate on the body

N78-33730

## MICROORGANISMS

Response of terrestrial microorganisms to a simulated Martian environment

A78-53624

## MICROWAVES

Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system

[PNL-2634] N78-33720

Translations USSR science and technology: Biomedical and behavioral sciences, no. 45:

Effects of nonionizing electromagnetic radiation

[JPRS-71910] N78-33727

Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems

N78-33728

## MILLIMETER WAVES

Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation

[JPRS-71910] N78-33727

Biomedical effects of millimeter radio waves

N78-33729

## MINORITIES

The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success

[AD-A055009] N78-32722

## MISSION PLANNING

Medical and psychological selection and training criteria for European SL-payload specialists

[AAS PAPER 78-028] A78-53608

## MITOCHONDRIA

Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity

A78-51394

## MITOSIS

Regions of differential cell elongation and mitosis, and root meristem morphology in different tissues of geotropically stimulated maize root apices

A78-52631

## MODULATION TRANSFER FUNCTION

How presaccadic gratings modify postsaccadic modulation transfer function

A78-51953

## MOLECULAR STRUCTURE

Computer display and manipulation of biological molecules

A78-53400

## MOLECULES

Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems

N78-33728

## MORPHOLOGY

Fine morphology of the tectorial membrane - Fresh and developmental

A78-53392

## MOTION PERCEPTION

The effect of helmet loader G-cueing on pilot's simulator performance

[AIAA 78-1573] A78-50654

Platform motion for fighter simulations --- flight training simulators

[AIAA 78-1574] A78-50655

Smooth eye tracking and the perception of motion in the absence of real movement

A78-51951

## MOTION SIMULATORS

Platform motion for fighter simulations --- flight training simulators

[AIAA 78-1574] A78-50655

Optimal control theory applied to the design of cue shaping filters for motion-base simulators

[AIAA 78-1575] A78-50656

Motion - Methods and requirements --- flight training simulators

[AIAA 78-1576] A78-50657

Depth perception and motion cues via textured scenes --- in flight simulators

[AIAA 78-1577] A78-50658

## MOUNTAIN INHABITANTS

Multinational Andean Genetic and Health Program, VII - Lung function and physical growth - Multivariate analyses in high- and low-altitude populations

A78-52639

Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude

A78-53711

## MUSCLES

Blood flow and relative tissue PO2 of brain and muscle - Role of carotid chemoreceptors

A78-52542

Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise

A78-52545

## MUSCULAR FUNCTION

Quantitative systems analysis of various regimes of intense muscular loading

A78-51320

Effects of weightlessness and hypokinesia on contractility of bundles of glycerin-treat rat muscle fibers

N78-32689

## MUSCULAR STRENGTH

Pull force capabilities for parachute ripcord release

[MEMO-33] N78-32723

## MYOCARDIAL INFARCTION

Development of radiation lesions to the rat heart during a space flight (experimental morphological study)

N78-32690

N

## NEURAL NETS

Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells

A78-52444



- NEURONS**  
Interrelationship of the properties of visual neurons A78-51319
- NEUROPHYSIOLOGY**  
The consolidation process and some of its neurochemical mechanisms A78-51318  
Interrelationship of the properties of visual neurons A78-51319  
Effect of hypokinesia on the contractile function and neural regulation of the heart A78-53789
- NITROGEN DIOXIDE**  
Effects of nitrogen dioxide on pulmonary function in human subjects [PB-281186/7] N78-33723
- NITROGEN METABOLISM**  
Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism N78-32687
- NOISE INJURIES**  
Bleeding into inner ears of chinchillas caused by simulated sonic boom A78-51847  
An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla A78-53398
- NOISE INTENSITY**  
The effect of sound duration on annoyance A78-51841
- NOISE THRESHOLD**  
The effort of noise exposure on the masking level difference N78-33709
- Nonequilibrium Conditions**  
Condition sensor system and method [NASA-CASE-MSC-14805-1] N78-32720
- NUTRITIONAL REQUIREMENTS**  
Anaerobic utilization of phosphite and hypophosphite by *Bacillus* sp. A78-53625
- NYSTAGMUS**  
The interaction between the utricles and the semicircular canals during eccentric rotation N78-33714
- O**
- OCULOMOTOR NERVES**  
The effect of luminance on human smooth pursuit of perifoveal and foveal targets A78-51952
- OPERATOR PERFORMANCE**  
Unimanual and bimanual control in a compensatory tracking task A78-51347  
Comparison of the vigilance performance of men and women using a simulated radar task A78-52642
- OPTICAL ILLUSION**  
Smooth eye tracking and the perception of motion in the absence of real movement A78-51951
- OPTICAL MEASURING INSTRUMENTS**  
Optical probe --- a rectal probe [NASA-CASE-NPO-14247-1] N78-33715
- OPTICAL TRACKING**  
A model for the pilot's use of motion cues in steady-state roll-axis tracking tasks [AIAA 78-1593] A78-50668  
Smooth eye tracking and the perception of motion in the absence of real movement A78-51951
- OPTICAL WAVEGUIDES**  
Visual stimulator --- for critical flicker fusion experiments A78-52704
- OPTIMAL CONTROL**  
Optimal control theory applied to the design of cue shaping filters for motion-base simulators [AIAA 78-1575] A78-50656
- OPTOMETRY**  
Aeromedical implications of the X-Chrom lens for improving color vision deficiencies [AD-A054794] N78-32708
- ORBITAL SPACE STATIONS**  
Manned maneuvering unit - A space platform support system [AIAA PAPER 78-1663] A78-51990
- ORGAN WEIGHT**  
Biological effects of high strength electric fields on small laboratory animals [HCP/T1830-03] N78-33706
- ORGANIC COMPOUNDS**  
Photocatalytic oxidation of organic compounds on Mars A78-51137  
Toxicity of gaseous halogenated organic compounds. A bibliography with abstracts [NTIS/PS-78/0600/3] N78-32712
- ORGANS**  
Quantitative organ visualization N78-33708
- ORTHOSTATIC TOLERANCE**  
Effect of the combination of dry air heat and cold water treatment on human orthostatic stability N78-32695
- OSCILLATING FLOW**  
Small oscillations of an ideal fluid with consideration of mass forces in the elastic shell A78-51386
- OTOLOGY**  
Inner ear biology; Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977 A78-53391
- OXIDATION**  
Photocatalytic oxidation of organic compounds on Mars A78-51137
- OXYGEN CONSUMPTION**  
Oxygen consumption during constant-load exercise A78-52540  
The importance of the perilymphatic oxygen supply in the cochlea function A78-53395  
The scaling of maximal oxygen consumption and pulmonary dimensions in small mammals A78-53710
- OXYGEN MASKS**  
Three-dimensional anthropometry of the adult face --- bioengineering for protective breathing equipment [AD-A054938] N78-32705
- OXYGEN METABOLISM**  
Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia A78-53788
- OXYGEN TENSION**  
Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Role of carotid chemoreceptors A78-52542  
The importance of the perilymphatic oxygen supply in the cochlea function A78-53395
- OXYGENATION**  
Hyperbaric oxygenation. A bibliography with abstracts [NTIS/PS-78/0676/3] N78-33724
- P**
- PARACHUTE DESCENT**  
Full force capabilities for parachute ripcord release [MEMO-33] N78-32723
- PASSENGERS**  
Effect of vibration duration on human discomfort --- passenger comfort and random vibration [NASA-TP-1283] N78-32717
- PATHOLOGICAL EFFECTS**  
Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism N78-32687
- PATHOLOGY**  
Some findings on the inner ear after experimental obliteration of the endolymphatic duct and sac of guinea pigs A78-53396
- PERFORMANCE PREDICTION**  
Prediction, evaluation, and specification of closed loop and multiaxis flying qualities [AD-A056983] N78-33736

# PERFORMANCE TESTS

# SUBJECT INDEX

## PERFORMANCE TESTS

Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report  
[PB-281475/4] N78-33744

## PERIPHERAL CIRCULATION

Use of the auricle-floor temperature of the rabbit as an index of skin blood flow A78-53792

## PERIPHERAL VISION

Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation A78-51871

## PERSONNEL SELECTION

Objective assessment of prior air traffic control-related experience through the use of an occupational knowledge test A78-52636

Use of path models to study a precareer air traffic control training program A78-52641

Bleeding duodenal ulcer and the flier A78-52646

Stability of characteristics of alternate forms of a test battery [PB-280958/0] N78-32719

The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success [AD-A055009] N78-32722

## PERSPIRATION

Relationship between osmotic pressure of the blood and secretion of sweat [NASA-TM-75461] N78-33703

## PH

Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise A78-52545

## PHARMACOLOGY

An audiometric and histologic comparison of noise- and drug-induced cochlear pathology in the chinchilla A78-53398

Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2 [AD-A056312] N78-33719

## PHOSPHORUS METABOLISM

Anaerobic utilization of phosphite and hypophosphite by Bacillus sp. A78-53625

## PHOSPHORUS OXIDES

Anaerobic utilization of phosphite and hypophosphite by Bacillus sp. A78-53625

## PHOTOCHEMICAL REACTIONS

Photocatalytic oxidation of organic compounds on Mars A78-51137

## PHOTORECEPTORS

Mechanism for the formation of synaptic projections in the arthropod visual system A78-52372

Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells A78-52444

## PHOTOSENSITIVITY

Psychophysiological distinctions of pilot performance during brief exposure to intensive photic stimuli N78-32678

## PHOTOSYNTHESIS

Biophysics of photosynthesis A78-53848

## PHYSICAL EXERCISE

Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness A78-51300

Quantitative systems analysis of various regimes of intense muscular loading A78-51320

Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man A78-52537

Effects of exercise, altitude, and food on blood hormone and metabolite levels A78-52538

Metabolic structure of the recovery process following various physical stresses A78-53791

Experimental attempts to evoke a differential response to different stressors [AD-A054795] N78-32716

## PHYSICAL FITNESS

Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness A78-51300

Metabolic structure of the recovery process following various physical stresses A78-53791

Physical fitness of permanent lowland and highland residents N78-32679

## PHYSICAL WORK

Oxygen consumption during constant-load exercise A78-52540

Impedance cardiography for estimating cardiac output during submaximal and maximal work A78-52544

Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work A78-52638

## PHYSIOLOGICAL DEFENSES

Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia A78-53788

## PHYSIOLOGICAL EFFECTS

The mechanisms of development of morphological changes in mammals on biosatellites A78-50997

Effects of exercise, altitude, and food on blood hormone and metabolite levels A78-52538

Space biology and aerospace medicine, no. 4 [JPRS-71830] N78-32672

Effects of weightlessness and hypokinesia on contractility of bundles of glycerin-treated rat muscle fibers N78-32689

Volume-restricted freezing of living cells and tissues [ORNL/MIT-265] N78-33705

## PHYSIOLOGICAL RESPONSES

Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness A78-51300

Quantitative systems analysis of various regimes of intense muscular loading A78-51320

Studies on the light and dark adaptation system in the retina A78-51873

Binocular interactions during establishment of McCollough effects --- color aftereffects A78-51955

Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast A78-51956

Effect of impulse accelerations on the condition of the cardiovascular system of healthy people A78-52274

Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells A78-52444

Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man A78-52537

Controlled cellular energy conversion in brown adipose tissue thermogenesis A78-52698

- Circadian rhythm dissociation in an environment with conflicting temporal information A78-52699
- Criteria for quantitative evaluation of respiratory system responses A78-53790
- Physical fitness of permanent lowland and highland residents N78-32679
- Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite N78-32681
- Experimental attempts to evoke a differential response to different stressors [AD-A054795] N78-32716
- Physical mechanisms for biological effects of ultrasound [PB-282234/4] N78-33725
- PHYSIOLOGICAL TESTS**
- The role of a decrease in body heat content in the thermoregulatory response of ear passages A78-51661
- Role of the paradoxical phase in the organization of the sleep-wakefulness cycle in the rat A78-53786
- REM deprivation by stimulation of the reticular formation in the rat A78-53787
- Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates N78-32674
- Development of the aviation stress protocol: Simulation and performance, physiological, and biochemical monitoring systems, phase 1 N78-32700
- PILOT PERFORMANCE**
- Human-factors optimization of displays and control units for pilot and copilot A78-50267
- Verification of workload - A job for simulation --- pilot performance [AIAA 78-1586] A78-50664
- Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction [AIAA 78-1592] A78-50667
- A model for the pilot's use of motion cues in steady-state roll-axis tracking tasks [AIAA 78-1593] A78-50668
- Time delays in flight simulators - Behavioral and engineering analyses [AIAA 78-1596] A78-50670
- A review of human factors engineering studies at Aeromedical Laboratory A78-51498
- Visual problems of pilots - Study on distance judgement of pilots A78-51500
- Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation --- German thesis A78-52497
- Workload and fatigue-in-flight EEG changes A78-52640
- U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75 A78-52644
- Psychophysiological distinctions of pilot performance during brief exposure to intensive photic stimuli N78-32678
- Three reports relevant to stress in aviation personnel [AD-A051690] N78-32699
- Development of the aviation stress protocol: Simulation and performance, physiological, and biochemical monitoring systems, phase 1 N78-32700
- Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, Gz, and fatigue tolerances --- pilot performance [AD-A055089] N78-32707
- Adaptation of time line analysis program to single pilot instrument flight research [NASA-TM-78748] N78-33731
- Prediction, evaluation, and specification of closed loop and multi-axis flying qualities [AD-A056983] N78-33736
- Visual performance/workload of helicopter pilots during instrument flight [AD-A055424] N78-33738
- PILOT SELECTION**
- Space biology and aerospace medicine, no. 4 [JPRS-71830] N78-32672
- Polish cosmonaut selection process described N78-33033
- PILOT TRAINING**
- The effect of helmet loader G-cueing on pilot's simulator performance [AIAA 78-1573] A78-50654
- Motion - Methods and requirements --- flight training simulators [AIAA 78-1576] A78-50657
- Computer implemented grading of flight simulator students [AIAA 78-1589] A78-50665
- Autogenic training in a practical course of summer instruction of student pilots A78-52275
- Contributions regarding work load measurement and learning behavior in simulated STOL approaches --- German book A78-52499
- PLANETARY ENVIRONMENTS**
- Response of terrestrial microorganisms to a simulated Martian environment A78-53624
- PLANT ROOTS**
- Regions of differential cell elongation and mitosis, and root meristem morphology in different tissues of geotropically stimulated maize root apices A78-52631
- PLANTS (BOTANY)**
- Present status of the problem concerning the detection of gravity by plants A78-50998
- Effects of altered gravity on viscosity of cytoplasm and protein content of plant cells N78-32691
- PLATFORMS**
- Platform motion for fighter simulations --- flight training simulators [AIAA 78-1574] A78-50655
- PNEUMATIC CONTROL**
- Pneumatic inflatable end effector [NASA-CASE-MFS-23696-1] N78-32724
- PNEUMATIC EQUIPMENT**
- Pneumatic inflatable end effector [NASA-CASE-MFS-23696-1] N78-32724
- POLAND**
- Polish cosmonaut selection process described N78-33033
- POLLUTION MONITORING**
- Biological water quality monitoring using chemiluminescent and bioluminescent techniques [NASA-CR-156830] N78-33702
- POLYCYTHEMIA**
- Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia A78-53788
- PORPHYRINS**
- Research and development of a luminol-carbon monoxide flow system [NASA-CR-156832] N78-32671
- POSITION (LOCATION)**
- Saccadic eye movements and localization of visual stimuli A78-53083
- POSTFLIGHT ANALYSIS**
- The mechanisms of development of morphological changes in mammals on biosatellites A78-50997
- Inhibition of bone formation during space flight A78-51225
- POSTURE**
- Plasma volume changes with movement to supine and standing positions A78-52541
- The lumbosacral segment as a vulnerable region in various postures [NASA-TM-75579] N78-33713

# POTASSIUM

# SUBJECT INDEX

## POTASSIUM

Electrolyte content of the myocardium, skeletal muscles and blood of rats during prolonged hypokinesia and readaption

N78-32692

The correlation of sodium and potassium metabolism with the level of energy consumption in man during adaptation to heat

[NASA-TM-75331] N78-32704

## POTASSIUM CHLORIDES

Kaliuretic renal function in man as related to different degrees of exercise during bedrest

N78-32675

## PROBABILITY DISTRIBUTION FUNCTIONS

Estimation of the operating characteristics of item response categories 4: Comparison of the different methods

[AD-A057161] N78-33735

## PROMETHAZINE

Endogenous histamine and promethazine-induced gastric ulcers in the guinea pig

[NASA-TM-75341] N78-32668

## PROPRIOCEPTION

Sensory components of bite-force response in the rat

A78-51875

## PROTECTIVE CLOTHING

Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts

[NTIS/PS-78/0866/0] N78-33726

## PROTEIN METABOLISM

On the possible role of lysosomal proteinases in the biological effects of accelerations

N78-32685

Effects of altered gravity on viscosity of cytoplasm and protein content of plant cells

N78-32691

## PSYCHOLOGICAL FACTORS

Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data

A78-51887

Autogenic training in a practical course of summer instruction of student pilots

A78-52275

## PSYCHOLOGICAL TESTS

Binocular interactions during establishment of McCollough effects --- color aftereffects

A78-51955

Stability of characteristics of alternate forms of a test battery

[PB-280958/0] N78-32719

The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success

[AD-A055009] N78-32722

Estimation of the operating characteristics of item response categories 4: Comparison of the different methods

[AD-A057161] N78-33735

## PSYCHOMOTOR PERFORMANCE

The effect of luminance on human smooth pursuit of perifoveal and foveal targets

A78-51952

## PSYCHOPHYSICS

Sensory components of bite-force response in the rat

A78-51875

Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system

[AD-A055706] N78-33732

## PSYCHOPHYSIOLOGY

Texture discrimination and Fourier analysis in human vision

A78-53865

Psychophysiological distinctions of pilot performance during brief exposure to intensive photic stimuli

N78-32678

Polish cosmonaut selection process described

N78-33033

## PUBLIC HEALTH

Acrylonitrile

[PB-280478/9] N78-32713

Air pollution assessment of vinylidene chloride

[PB-280624/8] N78-32714

## PULLING

Pull force capabilities for parachute ripcord release

[MEMO-33] N78-32723

## PULMONARY FUNCTIONS

Regional lung expansion at total lung capacity in intact vs. excised canine lungs

A78-52539

Multinational Andean Genetic and Health Program. VII - Lung function and physical growth - Multivariate analyses in high- and low-altitude populations

A78-52639

The scaling of maximal oxygen consumption and pulmonary dimensions in small mammals

A78-53710

Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude

A78-53711

Criteria for quantitative evaluation of respiratory system responses

A78-53790

Effects of nitrogen dioxide on pulmonary function in human subjects

[PB-281186/7] N78-33723

## PULSED LASERS

Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses

A78-51078

## PURSUIT TRACKING

The effect of luminance on human smooth pursuit of perifoveal and foveal targets

A78-51952

# R

## RADAR TRACKING

Comparison of the vigilance performance of men and women using a simulated radar task

A78-52642

## RADIATION DISTRIBUTION

Quantitative organ visualization

N78-33708

## RADIATION DOSAGE

Fast neutron depth dose distributions in a heterogeneous phantom

N78-33712

Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements

[LA-UR-78-1063] N78-33721

## RADIATION EFFECTS

Physical mechanisms for biological effects of ultrasound

[PB-282234/4] N78-33725

Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation

[JPRS-71910] N78-33727

## RADIATION INJURIES

Investigation of the influence of prolonged rotation on radiation lesions

N78-32682

Development of radiation lesions to the rat heart during a space flight (experimental morphological study)

N78-32690

## RADIATION PROTECTION

The preventive role of ultraviolet radiation during exposure to ionizing radiation

[NASA-TM-75106] N78-33710

## RADIATION TOLERANCE

Distinctions of radioprotective effect of acute hypoxia on 5-day-old mice preadapted to oxygen deficiency

N78-32683

## RADIO WAVES

Biomedical effects of millimeter radio waves

N78-33729

## RADIOGRAPHY

Regional lung expansion at total lung capacity in intact vs. excised canine lungs

A78-52539

## RADIOPATHOLOGY

The preventive role of ultraviolet radiation during exposure to ionizing radiation

[NASA-TM-75106] N78-33710

## RANDOM VIBRATION

Effect of vibration duration on human discomfort --- passenger comfort and random vibration

[NASA-TP-1283] N78-32717

# SUBJECT INDEX

# SALYUT SPACE STATION

**RAPID EYE MOVEMENT STATE**  
REM deprivation by stimulation of the reticular formation in the rat  
A78-53787

**RATS**  
Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice [NASA-CASE-ARC-11114-1]  
N78-33717

**REACTION KINETICS**  
Biophysics of photosynthesis  
A78-53848

**REACTION TIME**  
Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation  
A78-51871

**REAL TIME OPERATION**  
Real-time compression of ECG data - Technical realization  
A78-51459

**RECEPTORS (PHYSIOLOGY)**  
Studies on the light and dark adaptation system in the retina  
A78-51873

**RECTUM**  
Optical probe --- a rectal probe [NASA-CASE-NPO-14247-1]  
N78-33715

**REGULATIONS**  
Respirator selection [LA-UR-78-119]  
N78-32725

**RELEASING**  
Pull force capabilities for parachute ripcord release [MEMO-33]  
N78-32723

**RELIABILITY ANALYSIS**  
Stability of characteristics of alternate forms of a test battery [PB-280958/0]  
N78-32719

**REQUIREMENTS**  
Respirator selection [LA-UR-78-119]  
N78-32725

**RESEARCH AND DEVELOPMENT**  
Reviews on research and development with respect to the life support equipments in JASDF and its perspectives  
A78-51499

**RESPIRATION**  
Breathing pattern in men during inspiratory elastic loads  
A78-53712

**RESPIRATORS**  
Respirator selection [LA-UR-78-119]  
N78-32725  
Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice [NASA-CASE-ARC-11114-1]  
N78-33717

**RESPIRATORY DISEASES**  
Effects of nitrogen dioxide on pulmonary function in human subjects [PB-281186/7]  
N78-33723

**RESPIRATORY IMPEDANCE**  
Breathing pattern in men during inspiratory elastic loads  
A78-53712

**RESPIRATORY PHYSIOLOGY**  
Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity  
A78-51394  
Regional lung expansion at total lung capacity in intact vs. excised canine lungs  
A78-52539  
Gas elimination during a single-stage decompression  
A78-52637  
Criteria for quantitative evaluation of respiratory system responses  
A78-53790  
Cardiorespiratory assessment of decongestant-antihistamine effects on altitude,  $\rho G_z$ , and fatigue tolerances --- pilot performance [AD-A055089]  
N78-32707

**RESPIRATORY RATE**  
Oxygen consumption during constant-load exercise  
A78-52540

**RESPONSES**  
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods [AD-A057161]  
N78-33735

**REST**  
Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537  
Metabolic structure of the recovery process following various physical stresses  
A78-53791

**RETINA**  
Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses  
A78-51078

**RETINAL ADAPTATION**  
Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast  
A78-51956  
Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells  
A78-52444

**RETINAL IMAGES**  
Visual problems of pilots - Study on distance judgement of pilots  
A78-51500  
Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation  
A78-51871  
Contrast sensitivity during saccadic eye movements  
A78-51954  
Binocular interactions during establishment of McCollough effects --- color aftereffects  
A78-51955  
Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast  
A78-51956  
A facilitation effect in orientation discrimination --- relation to visual stimulus onset asynchrony  
A78-51957  
Hysteresis in human binocular fusion: A second look  
N78-33711

**RHEOLOGY**  
A rheological model for research on cochlear hypoxia  
A78-53394

**RHEOMETERS**  
Evaluation of regional blood filling by means of rheoplethysmography combined with functional tests  
N78-32676

**RIBONUCLEIC ACIDS**  
Aminoacyl-tRNA synthetase families and their significance to the origin of the Genetic Code  
A78-53873

**ROTATING ENVIRONMENTS**  
The interaction between the utricles and the semicircular canals during eccentric rotation  
N78-33714

**ROTATION**  
Egocentric orientation is influenced by trained voluntary cyclorotary eye movements  
A78-51856

## S

**SACCADIC EYE MOVEMENTS**  
How presaccadic gratings modify postsaccadic modulation transfer function  
A78-51953  
Contrast sensitivity during saccadic eye movements  
A78-51954  
Saccadic eye movements and localization of visual stimuli  
A78-53083

**SAFETY DEVICES**  
Reviews on research and development with respect to the life support equipments in JASDF and its perspectives  
A78-51499  
Anthropometry: Basic studies and applications, volume 2. A bibliography with abstracts [NTIS/PS-78/0866/0]  
N78-33726  
Vehicle integration and evaluation of advanced restraint systems. Restraint system analysis report [PB-281475/4]  
N78-33744

**SALYUT SPACE STATION**  
Biological experiments on board Salyut-6  
N78-34032

## SCENE ANALYSIS

## SUBJECT INDEX

## SCENE ANALYSIS

Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation --- German thesis  
A78-52497

## SCREENS

A literature review: Problem definition studies on selected toxic chemicals. Volume 4: Occupational health and safety aspects of the fog oils SGF No. 1 and SGF No. 2 and smoke screens generated from them  
[AD-A055903] N78-32709

## SEA WATER

The effect of seawater on thermoregulator centers  
[NASA-TM-75443] N78-32669

## SEAT BELTS

Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977  
[AD-A056905] N78-33737

## SEATS

Development and validation of drive concepts for an advanced G-cuing system --- fighter/attack aircraft flying training simulators  
[AIAA 78-1571] A78-50652

Development of the Advanced G Cuing System --- tactical flight simulators  
[AIAA 78-1572] A78-50653

Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977  
[AD-A056905] N78-33737

G-seat component development  
[AD-A055533] N78-33740

Emulation of an advanced G-seat on the advanced simulator for pilot training  
[AD-A055532] N78-33741

## SELECTION

Respirator selection  
[LA-OR-78-119] N78-32725

## SEMICIRCULAR CANALS

The interaction between the utricles and the semicircular canals during eccentric rotation  
N78-33714

## SENSITOMETRY

Condition sensor system and method  
[NASA-CASE-MSC-14805-1] N78-32720

## SENSORIMOTOR PERFORMANCE

Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation  
A78-51871

Sensory components of bite-force response in the rat  
A78-51875

## SENSORY DEPRIVATION

Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887

## SEX FACTOR

Comparison of the vigilance performance of men and women using a simulated radar task  
A78-52642

## SHORT TAKEOFF AIRCRAFT

Contributions regarding work load measurement and learning behavior in simulated STOL approaches --- German book  
A78-52499

## SIM

Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction  
[AIAA 78-1592] A78-50667

## SKIN (ANATOMY)

Use of the auricle-floor temperature of the rabbit as an index of skin blood flow  
A78-53792

## SKYLAB PROGRAM

Evaporative water loss in man in a gravity-free environment  
A78-52543

## SLEEP DEPRIVATION

Role of the paradoxical phase in the organization of the sleep-wakefulness cycle in the rat  
A78-53786

REM deprivation by stimulation of the reticular formation in the rat  
A78-53787

## SMOKE

A literature review: Problem definition studies on selected toxic chemicals. Volume 4: Occupational health and safety aspects of the fog oils SGF No. 1 and SGF No. 2 and smoke screens generated from them  
[AD-A055903] N78-32709

## SOCIAL ISOLATION

Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887

## SODIUM

Electrolyte content of the myocardium, skeletal muscles and blood of rats during prolonged hypokinesia and readaption  
N78-32692

The correlation of sodium and potassium metabolism with the level of energy consumption in man during adaptation to heat  
[NASA-TM-75331] N78-32704

## SOILS

Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
A78-53874

## SONIC BOOMS

Bleeding into inner ears of chinchillas caused by simulated sonic boom  
A78-51847

## SOUND INTENSITY

The relationship between comfortable loudness range and most comfortable loudness for pure tones and speech in sensorineural hearing loss  
N78-32698

## SOUND PRESSURE

The effect of sound duration on annoyance  
A78-51841

## SPACE FLIGHT

Development of modern spacesuits  
N78-33034

## SPACE FLIGHT FEEDING

Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work  
A78-52638

## SPACE FLIGHT STRESS

The mechanisms of development of morphological changes in mammals on biosatellites  
A78-50997

Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887

Space biology and aerospace medicine, no. 4  
[JPRS-71830] N78-32672

Evaluation of regional blood filling by means of rheoplethysmography combined with functional tests  
N78-32676

Dynamics of free amino acid levels in human blood plasma during bed rest in head down position  
N78-32677

Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite  
N78-32681

Morphological study of hemopoietic organs of hypokinetic rats  
N78-32686

Development of radiation lesions to the rat heart during a space flight (experimental morphological study)  
N78-32690

Effect of coriolis accelerations on man's ability to determine the direction of gravitational vertical  
N78-32694

## SPACE FLIGHT TRAINING

Medical and psychological selection and training criteria for European SL-payload specialists  
[AAS PAPER 78-028] A78-53608

## SPACE PERCEPTION

Depth perception and motion cues via textured scenes --- in flight simulators  
[AIAA 78-1577] A78-50658

Visual problems of pilots - Study on distance judgement of pilots  
A78-51500

- Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation --- German thesis  
A78-52497
- SPACE SHUTTLE PAYLOADS**  
The NASA Life Sciences experiment program for Shuttle/Spacelab  
[AAS PAPER 78-010] A78-53615
- SPACE SUITS**  
Cooling system for removing metabolic heat from an hermetically sealed spacesuit  
[NASA-CASE-ARC-11059-1] N78-32721  
Development of modern spacesuits  
N78-33034
- SPACEBORNE EXPERIMENTS**  
Life sciences laboratories in Spacelab  
[AAS PAPER 78-011] A78-53613  
The NASA Life Sciences experiment program for Shuttle/Spacelab  
[AAS PAPER 78-010] A78-53615
- SPACECRAFT DESIGN**  
Spacelab life support and habitability systems growth for extended mission durations  
[AIAA PAPER 78-1672] A78-51997
- SPACELAB**  
Spacelab life support and habitability systems growth for extended mission durations  
[AIAA PAPER 78-1672] A78-51997  
Medical and psychological selection and training criteria for European SL-payload specialists  
[AAS PAPER 78-028] A78-53608
- SPACELAB PAYLOADS**  
Life sciences laboratories in Spacelab  
[AAS PAPER 78-011] A78-53613  
The NASA Life Sciences experiment program for Shuttle/Spacelab  
[AAS PAPER 78-010] A78-53615
- SPEECH RECOGNITION**  
The relationship between comfortable loudness range and most comfortable loudness for pure tones and speech in sensorineural hearing loss  
N78-32698
- SPINAL CORD**  
Dynamics of afferent impulsation in posterior spinal radicles of dogs with restricted movement  
N78-32696
- SPIKE**  
The lumbosacral segment as a vulnerable region in various postures  
[NASA-TM-75579] N78-33713
- STANDARDS**  
GOI anomaloscopes used to set standards for color vision of flight personnel  
N78-32688
- STATISTICAL ANALYSIS**  
Use of path models to study a precareer air traffic control training program  
A78-52641  
Estimation of the operating characteristics of item response categories 4: Comparison of the different methods  
[AD-A057161] N78-33735
- STEREOSCOPIC VISION**  
Binocular detection by normal and stereoblind observers  
A78-53082
- STERILIZATION**  
Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
A78-53874
- STIMULANT**  
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain  
N78-33701
- STRESS (BIOLOGY)**  
Experimental attempts to evoke a differential response to different stressors  
[AD-A054795] N78-32716
- STRESS (PHYSIOLOGY)**  
Metabolic structure of the recovery process following various physical stresses  
A78-53791  
Three reports relevant to stress in aviation personnel  
[AD-A051690] N78-32699
- Development of the aviation stress protocol: Simulation and performance, physiological, and biochemical monitoring systems, phase 1  
N78-32700
- Assessment of cardiovascular function after exposure to the aviation stress protocol: Simulation  
N78-32701
- The relationship between stress-related metabolites and disqualifying pathology in air traffic control personnel  
N78-32702
- An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
[AD-A057113] N78-33733
- STRESS (PSYCHOLOGY)**  
Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres  
A78-51348
- SUPERHIGH FREQUENCIES**  
Translations USSR science and technology: Biomedical and behavioral sciences, no. 45: Effects of nonionizing electromagnetic radiation  
[JPRS-71910] N78-33727  
The combined effect of an SHF field and an unfavorable microclimate on the body  
N78-33730
- SUPINE POSITION**  
Plasma volume changes with movement to supine and standing positions  
A78-52541
- SUPPORT SYSTEMS**  
Manned maneuvering unit - A space platform support system  
[AIAA PAPER 78-1663] A78-51990
- SWEAT**  
Relationship between osmotic pressure of the blood and secretion of sweat  
[NASA-TM-75461] N78-33703
- SWIMMING**  
Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299
- SYNAPSES**  
Mechanism for the formation of synaptic projections in the arthropod visual system  
A78-52372
- SYNTHETIC FIBERS**  
Acrylonitrile  
[PB-280478/9] N78-32713
- SYNTHETIC RESINS**  
Air pollution assessment of vinylidene chloride  
[PB-280624/8] N78-32714
- T**
- TACHISTOSCOPES**  
Tachistoscopic perception under head tilt  
A78-53085
- TASK COMPLEXITY**  
Contributions regarding work load measurement and learning behavior in simulated STOL approaches --- German book  
A78-52499
- TEMPERATURE CONTROL**  
The effect of direct heating and cooling of heat regulation centers on body temperature  
[NASA-TM-75450] N78-32703
- TEST EQUIPMENT**  
GOI anomaloscopes used to set standards for color vision of flight personnel  
N78-32688
- TESTS**  
Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2  
[AD-A056312] N78-33719
- TEXTURES**  
Texture discrimination and Fourier analysis in human vision  
A78-53865
- THERMAL PROTECTION**  
Heat transfer principles in personal protection applications  
A78-51222



## THERMOREGULATION

- The role of a decrease in body heat content in the thermoregulatory response of ear passageways  
[A78-51661]
- The effect of seawater on thermoregulator centers  
[NASA-TM-75443] N78-32669
- The effect of direct heating and cooling of heat regulation centers on body temperature  
[NASA-TM-75450] N78-32703
- THRESHOLDS (PERCEPTION)**
- A facilitation effect in orientation discrimination --- relation to visual stimulus onset asynchrony  
A78-51957
- Auditory frequency selectivity and two-tone suppression in normal hearing human listeners  
N78-32697
- TIME DEPENDENCE**
- The effect of sound duration on annoyance  
A78-51841
- TIME LAG**
- Time delays in flight simulators - Behavioral and engineering analyses  
[AIAA 78-1596] A78-50670
- TIME RESPONSE**
- Circadian rhythm dissociation in an environment with conflicting temporal information  
A78-52699
- TISSUES (BIOLOGY)**
- Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses  
A78-51078
- Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia  
A78-51662
- Volume-restricted freezing of living cells and tissues  
[ORNL/MIT-265] N78-33705
- Tissue identification by ultrasound  
[NASA-CR-157776] N78-33716
- Physical mechanisms for biological effects of ultrasound  
[PB-282234/4] N78-33725
- TOLERANCES (PHYSIOLOGY)**
- Gas elimination during a single-stage decompression  
A78-52637
- The lumbosacral segment as a vulnerable region in various postures  
[NASA-TM-75579] N78-33713
- TOMOGRAPHY**
- Quantitative organ visualization  
N78-33708
- TOXIC HAZARDS**
- Acrylonitrile  
[PB-280478/9] N78-32713
- TOXICITY AND SAFETY HAZARD**
- A literature review: Problem definition studies on selected toxic chemicals. Volume 4: Occupational health and safety aspects of the fog oils SGF No. 1 and SGF No. 2 and smoke screens generated from them  
[AD-A055903] N78-32709
- Air pollution assessment of vinylidene chloride  
[PB-280624/8] N78-32714
- TOXICOLOGY**
- Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 1  
[AD-A056311] N78-33718
- Formation and management of an expert toxicological review team for literature search, evaluation and organization of currently available rapid toxicological tests, volume 2  
[AD-A056312] N78-33719
- TRACHEA**
- Micro-fluid exchange coupling apparatus --- a microrespirator to allow surgery on rats or mice  
[NASA-CASE-ARC-11114-1] N78-33717
- TRACKING FILTERS**
- Optimal control theory applied to the design of cue shaping filters for motion-base simulators  
[AIAA 78-1575] A78-50656
- TRAINING DEVICES**
- Motion - Methods and requirements --- flight training simulators  
[AIAA 78-1576] A78-50657
- Air Force aircrew training devices: Master plan  
[AD-A056940] N78-33734

## TRAINING EVALUATION

- The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success  
[AD-A055009] N78-32722

## TRAINING SIMULATORS

- Development and validation of drive concepts for an advanced G-cuing system --- fighter/attack aircraft flying training simulators  
[AIAA 78-1571] A78-50652
- Platform motion for fighter simulations --- flight training simulators  
[AIAA 78-1574] A78-50655
- A unique approach to aerial refueling simulation for training boom operators  
[AIAA 78-1591] A78-50666

## TRANSFUSION

- Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia  
A78-53788

## TRANSMISSION LINES

- Electrical and biological effects of transmission lines: A review  
[BPA-BIO-77-1] N78-33722

## TRANSVERSE ACCELERATION

- Regional redistribution of blood during the immediate aftereffect period following exposure of rats to transverse accelerations  
N78-32693

## U

## ULCERS

- Bleeding duodenal ulcer and the flier  
A78-52646
- Endogenous histamine and promethazine-induced gastric ulcers in the guinea pig  
[NASA-TM-75341] N78-32668
- The effect of various drugs on experimentally induced ulcers in immobilized rats  
[NASA-TM-75340] N78-32670

## ULTRASONIC RADIATION

- Physical mechanisms for biological effects of ultrasound  
[PB-282234/4] N78-33725

## ULTRASONIC TESTS

- Tissue identification by ultrasound  
[NASA-CR-157776] N78-33716

## ULTRAVIOLET RADIATION

- The preventive role of ultraviolet radiation during exposure to ionizing radiation  
[NASA-TM-75106] N78-33710

## V

## VASCULAR SYSTEM

- Evaluation of regional blood filling by means of rheoplethysmography combined with functional tests  
N78-32676

## VASOCONSTRICTION

- The role of a decrease in body heat content in the thermoregulatory response of ear passageways  
A78-51661

## VERTEBRAL COLUMN

- The lumbosacral segment as a vulnerable region in various postures  
[NASA-TM-75579] N78-33713

## VERTICAL PERCEPTION

- Egocentric orientation is influenced by trained voluntary cyclorotary eye movements  
A78-51856

- Mental rotation under head tilt - Factors influencing the location of the subjective reference frame  
A78-53084

- Tachistoscopic perception under head tilt  
A78-53085

## VESTIBULAR NYSTAGMUS

- A procedure for the automated analysis of vestibular nystagmus  
A78-50750

## VESTIBULES

- Some findings on the inner ear after experimental obliteration of the endolymphatic duct and sac of guinea pigs  
A78-53396

## SUBJECT INDEX

## WORKLOADS (PSYCHOPHYSIOLOGY)

- Investigation of the influence of prolonged rotation on radiation lesions N78-32682
- VIBRATION EFFECTS**  
Effect of vibration duration on human discomfort --- passenger comfort and random vibration [NASA-TP-1283] N78-32717
- VINYLLIDENE**  
Air pollution assessment of vinylidene chloride [PB-280624/8] N78-32714
- VISION**  
Mechanism for the formation of synaptic projections in the arthropod visual system A78-52372
- VISUAL ACUITY**  
Visual problems of pilots - Study on distance judgement of pilots A78-51500
- VISUAL AIDS**  
Aeromedical implications of the X-Chrom lens for improving color vision deficiencies [AD-A054794] N78-32708  
Area of interest/field-of-view research using ASPT --- flight helmets for pilot and gunnery trainers [AD-A055692] N78-32718
- VISUAL DISCRIMINATION**  
A facilitation effect in orientation discrimination --- relation to visual stimulus onset asynchrony A78-51957  
Texture discrimination and Fourier analysis in human vision A78-53865
- VISUAL FIELDS**  
Depth perception and motion cues via textured scenes --- in flight simulators [AIAA 78-1577] A78-50658  
Area of interest/field-of-view research using ASPT --- flight helmets for pilot and gunnery trainers [AD-A055692] N78-32718
- VISUAL FLIGHT**  
Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation --- German thesis A78-52497
- VISUAL PERCEPTION**  
Interrelationship of the properties of visual neurons A78-51319  
Studies on the light and dark adaptation system in the retina A78-51873  
Smooth eye tracking and the perception of motion in the absence of real movement A78-51951  
How presaccadic gratings modify postsaccadic modulation transfer function A78-51953  
Contrast sensitivity during saccadic eye movements A78-51954  
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain N78-33701  
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system [AD-A055706] N78-33732
- VISUAL STIMULI**  
Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation A78-51871  
Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast A78-51956  
A facilitation effect in orientation discrimination --- relation to visual stimulus onset asynchrony A78-51957  
Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells A78-52444  
Visual stimulator --- for critical flicker fusion experiments A78-52704
- Saccadic eye movements and localization of visual stimuli A78-53083  
Hysteresis in human binocular fusion: A second look N78-33711
- VISUAL TASKS**  
A model for the pilot's use of motion cues in steady-state roll-axis tracking tasks [AIAA 78-1593] A78-50668  
Comparison of the vigilance performance of men and women using a simulated radar task A78-52642  
Binocular detection by normal and stereoblind observers A78-53082  
Mental rotation under head tilt - Factors influencing the location of the subjective reference frame A78-53084  
Tachistoscopic perception under head tilt A78-53085
- VITAMINS**  
Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work A78-52638
- VOICE COMMUNICATION**  
Design of a system of man-computer communication A78-51640
- ## W
- WAKEFULNESS**  
Role of the paradoxical phase in the organization of the sleep-wakefulness cycle in the rat A78-53786
- WASTE WATER**  
Research and development of a luminol-carbon monoxide flow system [NASA-CR-156832] N78-32671
- WATER LOSS**  
Evaporative water loss in man in a gravity-free environment A78-52543
- WATER POLLUTION**  
Annotated bibliography on biological effects of metals in aquatic environments, 3d [PB-280953/1] N78-32715
- WATER QUALITY**  
Biological water quality monitoring using chemiluminescent and bioluminescent techniques [NASA-CR-156830] N78-33702
- WEIGHTLESSNESS**  
Evaporative water loss in man in a gravity-free environment A78-52543  
Effects of weightlessness and hypokinesia on contractility of bundles of glycerin-treat rat muscle fibers N78-32689
- WEIGHTLESSNESS SIMULATION**  
Fifty minute in hydraulic weightlessness N78-33018
- WORK CAPACITY**  
Verification of workload - A job for simulation --- pilot performance [AIAA 78-1586] A78-50664  
Quantitative systems analysis of various regimes of intense muscular loading A78-51320  
Oxygen consumption during constant-load exercise A78-52540
- WORK-REST CYCLE**  
Experimental attempts to evoke a differential response to different stressors [AD-A054795] N78-32716
- WORKLOADS (PSYCHOPHYSIOLOGY)**  
Verification of workload - A job for simulation --- pilot performance [AIAA 78-1586] A78-50664  
Closed loop models for analyzing the effects of simulator characteristics --- pilot performance/workload prediction [AIAA 78-1592] A78-50667  
Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres A78-51348

## X RAY ANALYSIS

## SUBJECT INDEX

Workload and fatigue-in-flight EEG changes A78-52640  
Adaptation of time line analysis program to single  
pilot instrument flight research N78-33731  
[NASA-TM-78748]

## X

## X RAY ANALYSIS

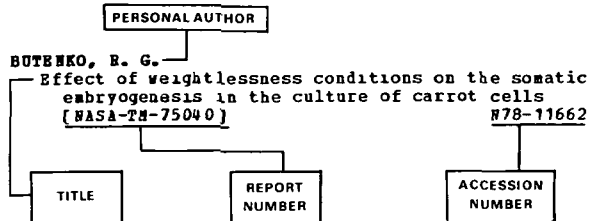
Regional lung expansion at total lung capacity in  
intact vs. excised canine lungs A78-52539  
X-ray analysis of biological specimens N78-33704  
[UR-3490-1341]

# PERSONAL AUTHOR INDEX

AEROSPACE MEDICINE AND BIOLOGY / A Continuing Bibliography (Suppl 188)

JANUARY 1979

## Typical Personal Author Index Listing



The title of the document is used to provide the user with a brief description of the subject matter. The NASA or AIAA accession number is included in each entry to assist the user in locating the abstract in the abstract section of this supplement. If applicable, a report number is also included as an aid in identifying the document.

## A

- AFANASTEV, B. G.**  
The correlation of sodium and potassium metabolism with the level of energy consumption in man during adaptation to heat  
[NASA-TN-75331] N78-32704
- AGOSTONI, E.**  
Breathing pattern in men during inspiratory elastic loads A78-53712
- AGUREEV, A. N.**  
Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work A78-52638
- AJELLO, J. H.**  
Photocatalytic oxidation of organic compounds on Mars A78-51137
- ALBERS, F. G.**  
A unique approach to aerial refueling simulation for training boom operators  
[AIAA 78-1591] A78-50666
- ALBERRY, W. B.**  
Development and validation of drive concepts for an advanced G-cuing system  
[AIAA 78-1571] A78-50652  
G-seat component development N78-33740  
Emulation of an advanced G-seat on the advanced simulator for pilot training  
[AD-A055532] N78-33741
- ALDRICH, K. A.**  
Program documentation for the terrain and flight dynamics program  
[AD-A056116] N78-33742
- ALEKSANDROVA, G. V.**  
Metabolic structure of the recovery process following various physical stresses A78-53791
- ALLEGRETTI, C.**  
Binocular detection by normal and stereoblind observers A78-53082
- ALVSTRAND, A.**  
Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise A78-52545
- AMENZADE, R. IU.**  
Small oscillations of an ideal fluid with consideration of mass forces in the elastic shell A78-51386

- ANDOH, Y.**  
Impedance cardiography for estimating cardiac output during submaximal and maximal work A78-52544
- ANTHONISEN, N. E.**  
Configuration of the chest wall during increased gravitational stress in erect humans A78-53709
- ANOZA, T.**  
Tachistoscopic perception under head tilt A78-53085
- ARAN, J.-H.**  
Inner ear biology; Proceedings of the Fourteenth Workshop, Bordeaux, France, September 5-7, 1977 A78-53391
- ARBER, S. L.**  
Cellular and molecular effects and the mechanism of action of microwave electromagnetic fields on biological systems N78-33728
- ARZANAZOV, G. S.**  
Kaliuretic renal function in man as related to different degrees of exercise during bedrest N78-32675
- ASATURYAN, V. I.**  
Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates N78-32674
- ASHWORTH, B. R.**  
The effect of helmet loader G-cueing on pilot's simulator performance  
[AIAA 78-1573] A78-50654
- AYTHAGAMBETOVA, B. Z.**  
Distinctions of radioprotective effect of acute hypoxia on 5-day-old mice preadapted to oxygen deficiency N78-32683

## B

- BABUSIKOVA, P.**  
Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming A78-51299
- BAEV, V. I.**  
Significance of glycolysis in tissues for the combined action of hypercapnia, hypoxia, and hypothermia A78-51662
- BAILEY, J. P.**  
Comparison of the vigilance performance of men and women using a simulated radar task A78-52642
- BALLIET, R.**  
Egocentric orientation is influenced by trained voluntary cyclorotary eye movements A78-51856
- BARBER, J.**  
Biophysics of photosynthesis A78-53848
- BARBOUR, H. G.**  
The effect of direct heating and cooling of heat regulation centers on body temperature  
[NASA-TN-75450] N78-32703
- BARON, S.**  
Closed loop models for analyzing the effects of simulator characteristics  
[AIAA 78-1592] A78-50667
- BARTA, E.**  
Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming A78-51299

- BASS, B. G.  
The effects of supranormal concentrations of potassium ion and other vasoactive drugs on the visual evoked response and regional cerebral blood flow in the monkey brain  
N78-33701
- BATUNER, L. S.  
Metabolic structure of the recovery process following various physical stresses  
A78-53791
- BAYLINK, D. J.  
Inhibition of bone formation during space flight  
A78-51225
- BELAKOVSKII, M. S.  
Effect of vitamin and amino acid supplements on human performance during heavy mental and physical work  
A78-52638
- BENEVOLENSKAYA, T. V.  
Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates  
N78-32674
- BERGHAGE, T. E.  
Gas elimination during a single-stage decompression  
A78-52637
- BEVAN, T.  
Biocybernetics experiment: Command and control human factors experimental program  
[AD-A055666]  
N78-32710
- BEYER, R.  
Human-factors optimization of displays and control units for pilot and copilot  
A78-50267
- BLAKE, L.  
Tachistoscopic perception under head tilt  
A78-53085
- BOBROVNITSKIY, I. P.  
Electrolyte content of the myocardium, skeletal muscles and blood of rats during prolonged hypokinesia and readaption  
N78-32692
- BOONE, J. O.  
Use of path models to study a precareer air traffic control training program  
A78-52641
- The relationship of predevelopmental 150 training with noncompetitively selected air traffic control trainees to FAA Academy success  
[AD-A055009]  
N78-32722
- BOOZE, C. F.  
U.S. fatal general aviation accidents due to cardiovascular incapacitation: 1974-75  
A78-52644
- BORSHCHENKO, V. V.  
Effect of the combination of dry air heat and cold water treatment on human orthostatic stability  
N78-32695
- BRACKEN, T. D.  
Electrical and biological effects of transmission lines: A review  
[BPA-BIO-77-1]  
N78-33722
- BRANDT, R.  
Intracellular pH and bicarbonate concentration in human muscle during recovery from exercise  
A78-52545
- BRANDT, W. E., JR.  
Program documentation for the terrain and flight dynamics program  
[AD-A056116]  
N78-33742
- BRESLAV, I. S.  
Criteria for quantitative evaluation of respiratory system responses  
A78-53790
- BROWN, J. L.  
A facilitation effect in orientation discrimination  
A78-51957
- BRVENIK, P.  
Resting values of left ventricular work to coronary blood flow ratio in rats exposed to intermittent high altitude hypoxia and swimming  
A78-51299
- BUCCIARELLI, T.  
Real-time compression of ECG data - Technical realization  
A78-51459

- BUCKLAND, G. H.  
Effects of platform motion, visual and G-seat factors upon experienced pilot performance, in the flight simulator  
[AD-A055691]  
N78-33739
- BULLOCK, M. I.  
Pull force capabilities for parachute ripcord release  
[MEMO-33]  
N78-32723
- BURR, M. J.  
Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, Gz, and fatigue tolerances  
[AD-A055089]  
N78-32707
- BYER, W. L.  
Acrylonitrile  
[PB-280478/9]  
N78-32713

## C

- CABERON, M. W.  
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
[AD-A057113]  
N78-33733
- CAMPBELL, I. T.  
Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538
- CAPOW, A. S.  
Electrical and biological effects of transmission lines: A review  
[BPA-BIO-77-1]  
N78-33722
- CABRIERO, M. J.  
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
[AD-A057113]  
N78-33733
- CASEY, R. C.  
Response of terrestrial microorganisms to a simulated Martian environment  
A78-53624
- CHAGOVETS, N. R.  
Metabolic structure of the recovery process following various physical stresses  
A78-53791
- CHAMBERS, D.  
Binocular detection by normal and stereoblind observers  
A78-53082
- CHANDLER, R. F.  
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977  
[AD-A056905]  
N78-33737
- CHANG, S.  
Chemical evolution and the origin of life - Bibliography supplement 1976  
A78-53875
- CHAPMAN, C.  
Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538
- CHERKASOV, I. S.  
Biomedical effects of millimeter radio waves  
N78-33729
- CHEVALIER, P. A.  
Regional lung expansion at total lung capacity in intact vs. excised canine lungs  
A78-52539
- CHIANTA, M. A.  
Heat transfer principles in personal protection applications  
A78-51222
- CHILES, W. D.  
The effects of altitude and two decongestant-antihistamine preparations on physiological functions and performance  
[AD-A054793]  
N78-32706
- CHU, Y. E.  
Volume-restricted freezing of living cells and tissues  
[ORNL/NIT-265]  
N78-33705
- CHUN, S. F. S.  
Photocatalytic oxidation of organic compounds on Mars  
A78-51137

- CLARK, K. H.  
Pneumatic inflatable end effector  
[NASA-CASE-MPS-23696-1] N78-32724
- CLEVENSON, S. A.  
Effect of vibration duration on human discomfort  
[NASA-TP-1283] N78-32717
- COECKELEBERGH, Y.  
Computer display and manipulation of biological molecules  
A78-53400
- COLEMAN, J. R.  
X-ray analysis of biological specimens  
[UR-3490-1341] N78-33704
- COMSTOCK, P. L.  
Computer implemented grading of flight simulator students  
[AIAA 78-1589] A78-50665
- CORBALLIS, M. C.  
Mental rotation under head tilt - Factors influencing the location of the subjective reference frame  
A78-53084  
Tachistoscopic perception under head tilt  
A78-53085
- CORNELL, C. O.  
Quantitative predictions of length in the Mueller-Lyer illusion as perceived by the human visual system  
[AD-A055706] N78-33732
- CRAIG, J. D.  
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
[AD-A057113] N78-33733
- CRAIG, P. W.  
A literature review: Problem definition studies on selected toxic chemicals. Volume 4: Occupational health and safety aspects of the fog oils SGF No. 1 and SGF No. 2 and smoke screens generated from them  
[AD-A055903] N78-32709
- CROCKETT, P. W.  
Toxicity of gaseous halogenated organic compounds. A bibliography with abstracts  
[NTIS/PS-78/0600/3] N78-32712
- CUMMINGS, G. D.  
The interaction between the utricles and the semicircular canals during eccentric rotation  
N78-33714
- CUTTS, J. A.  
Photocatalytic oxidation of organic compounds on Mars  
A78-51137
- D**
- DANGELO, E.  
Breathing pattern in men during inspiratory elastic loads  
A78-53712
- DAUNTON, M. G.  
Sensory components of bite-force response in the rat  
A78-51875
- DAVIS, A. W., JR.  
Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, +Gz, and fatigue tolerances  
[AD-A055089] N78-32707
- DEHAANSS, J. L.  
An annotated bibliography of the literature dealing with the physiological correlates of cognitive performance  
[AD-A057113] N78-33733
- DEMPSKY, T. K.  
Effect of vibration duration on human discomfort  
[NASA-TP-1283] N78-32717
- DIAZ, P. J.  
Plasma volume changes with movement to supine and standing positions  
A78-52541
- DINER, D. B.  
Hysteresis in human binocular fusion: A second look  
N78-33711
- DJAHANGUIRI, B.  
Endogenous histamine and promethazine-induced gastric ulcers in the guinea pig  
[NASA-TN-75341] N78-32668
- DOERFEL, G.  
Two methods for the investigation of visual positional perception on the basis of synthetically produced representations for visual flight simulation  
A78-52497
- DOMRACHEVA, M. V.  
Evaluation of regional blood filling by means of rheoplethysmography combined with functional tests  
N78-32676
- DONTAS, S.  
The effect of seawater on thermoregulator centers  
[NASA-TN-75443] N78-32669
- DOUGLAS, D. D.  
Respirator selection  
[LA-UR-78-119] N78-32725
- DRTIL, A.  
Spacelab life support and habitability systems growth for extended mission durations  
[AIAA PAPER 78-1672] A78-51997
- DUDETSKIY, V. I.  
Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite  
N78-32681
- DUNGAN, W. O., JR.  
Depth perception and motion cues via textured scenes  
[AIAA 78-1577] A78-50658
- DURNOVA, G. W.  
Development of radiation lesions to the rat heart during a space flight (experimental morphological study)  
N78-32690
- DYSON, C. V.  
Gas elimination during a single-stage decompression  
A78-52637
- E**
- EHRENBERGER, K.  
Functional evidence of efferent nerve endings in the human inner ear  
A78-53393
- EISLER, E.  
Annotated bibliography on biological effects of metals in aquatic environments, 3d  
[PB-280953/1] N78-32715
- ENGSTROM, S. D.  
Volume-restricted freezing of living cells and tissues  
[ORNL/MIT-265] N78-33705
- EVANS, E.  
Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537
- EYLER, T. E.  
Electrical and biological effects of transmission lines: A review  
[BPA-BIO-77-1] N78-33722
- F**
- FARBER, Y. V.  
Investigation of the influence of prolonged rotation on radiation lesions  
N78-32682
- FAULKNER, W. H.  
Prediction, evaluation, and specification of closed loop and multi-axis flying qualities  
[AD-A056983] N78-33736
- FELDMAN, R. S.  
Blood flow and relative tissue PO2 of brain and muscle - Role of carotid chemoreceptors  
A78-52542
- FERRERES, H. M.  
Workload and fatigue-in-flight EEG changes  
A78-52640
- FERRI-LUZZI, A.  
Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537
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- FORKERT, L.  
Configuration of the chest wall during increased gravitational stress in erect humans A78-53709
- POSTER, T. L.  
Response of terrestrial microorganisms to a simulated Martian environment A78-53624
- Anaerobic utilization of phosphite and hypophosphite by *Bacillus* sp. A78-53625
- FRAZER, R. E.  
Optical probe [NASA-CASE-NPO-14247-1] N78-33715
- FRISBY, J. P.  
Texture discrimination and Fourier analysis in human vision A78-53865
- FUJINAMI, T.  
Impedance cardiography for estimating cardiac output during submaximal and maximal work A78-52544
- FUKUROTANI, K.  
Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells A78-52444
- FULLER, C. A.  
Circadian rhythm dissociation in an environment with conflicting temporal information A78-52699
- FUNKHOUSER, G. E.  
The effects of altitude and two decongestant-antihistamine preparations on physiological functions and performance [AD-A054793] N78-32706

## G

- GABADZE, N. B.  
Effects of weightlessness and hypokinesia on contractility of bundles of glycerin-treat rat muscle fibers N78-32689
- GAMMELL, P. M.  
Tissue identification by ultrasound [NASA-CR-157776] N78-33716
- GAUTIER, H.  
Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude A78-53711
- GAYEVSKAYA, M. S.  
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- GAZENKO, O. G.  
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- GEKHMAN, B. I.  
Use of the auricle-floor temperature of the rabbit as an index of skin blood flow A78-53792
- GIBBONS, W. D.  
Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses A78-51078
- GILENKO, A. V.  
Biomedical effects of millimeter radio waves N78-33729
- GILL, R. T.  
Development and validation of drive concepts for an advanced G-cuing system [AIAA 78-1571] A78-50652
- GIROUX, M. S.  
Volume-restricted freezing of living cells and tissues [ORNL/MIT-265] N78-33705
- GOREA, A.  
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- GORINA, M. S.  
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- GORYACHEVA, L. L.  
Histochemical study of digestive organs of rats involved in space flight on the Kosmos-690 satellite N78-32681
- GRASSINO, A. E.  
Configuration of the chest wall during increased gravitational stress in erect humans A78-53709
- GRIGORYEV, A. I.  
Kaliuretic renal function in man as related to different degrees of exercise during bedrest N78-32675
- GRISHANOV, V. N.  
Regional redistribution of blood during the immediate aftereffect period following exposure of rats to transverse accelerations N78-32693
- GROUNAUER, P. A.  
Visual stimulator A78-52704
- GUY, A. W.  
Compilation and assessment of microwave bioeffects, AO-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system [PNL-2634] N78-33720
- GYUROZHIAN, A. A.  
Effect of coriolis accelerations on man's ability to determine the direction of gravitational vertical N78-32694

## H

- HABERLAND, E.-J.  
The importance of the perilymphatic oxygen supply in the cochlea function A78-53395
- HAGAN, R. D.  
Plasma volume changes with movement to supine and standing positions A78-52541
- HAGBERG, J. M.  
Oxygen consumption during constant-load exercise A78-52540
- HAGIHARA, H.  
A review of human factors engineering studies at Aeromedical Laboratory A78-51498
- HAINES, R. P.  
Visual response time to colored stimuli in peripheral retina - Evidence for binocular summation A78-51871
- HARA, K.-I.  
Neuronal network in the retina - Interactions between photoreceptors /cones/ and horizontal cells A78-52444
- HARRIS, L. D.  
Regional lung expansion at total lung capacity in intact vs. excised canine lungs A78-52539
- HARRIS, W. T.  
Motion - Methods and requirements [AIAA 78-1576] A78-50657
- Time delays in flight simulators - Behavioral and engineering analyses [AIAA 78-1596] A78-50670
- HARRISON, E. A.  
Altitude hypoxia. A bibliography with abstracts [NTIS/PS-78/0443] N78-32711
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- HART, J.  
Computer display and manipulation of biological molecules A78-53400

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between photoreceptors /cones/ and horizontal  
cells  
A78-52444
- HAUSKE, G.  
How presaccadic gratings modify postsaccadic  
modulation transfer function  
A78-51953
- HAYU, H.  
Lipid metabolism during exercise. I -  
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of normal healthy male subjects in relation to  
their physical fitness  
A78-51300
- HAY, A. E.  
Workload and fatigue-in-flight EEG changes  
A78-52640
- HEINTZMAN, R. J.  
A unique approach to aerial refueling simulation  
for training boom operators  
[AIAA 78-1591]  
A78-50666
- HELLOT, M. P.  
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natives and newcomers at high altitude  
A78-53711
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hypophosphite by *Bacillus* sp.  
A78-53625
- HEMMATI, H.  
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gastric ulcers in the guinea pig  
[NASA-TM-75341]  
N78-32668
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Tissue identification by ultrasound  
[NASA-CR-157776]  
N78-33716
- HIGGINS, E. A.  
Three reports relevant to stress in aviation  
personnel  
[AD-A051690]  
N78-32699
- The effects of altitude and two  
decongestant-antihistamine preparations on  
physiological functions and performance  
[AD-A054793]  
N78-32706
- HILDESHEIMER, H.  
A rheological model for research on cochlear hypoxia  
A78-53394
- HILES, L. G.  
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with conflicting temporal information  
A78-52699
- HINDS, W. T.  
Compilation and assessment of microwave  
bioeffects, AO-02-01/EA81028: A selective  
review of the literature on biological effects  
of microwaves in relation to the satellite power  
system  
[PNL-2634]  
N78-33720
- HINTON, D. A.  
Adaptation of time line analysis program to single  
pilot instrument flight research  
[NASA-TM-78748]  
N78-33731
- HIRAHATSU, K.  
The effect of sound duration on annoyance  
A78-51841
- HJERESSEN, D. L.  
Compilation and assessment of microwave  
bioeffects, AO-02-01/EA81028: A selective  
review of the literature on biological effects  
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system  
[PNL-2634]  
N78-33720
- HOCHSTEIN, L. I.  
The metabolism of carbohydrates by extremely  
halophilic bacteria - The identification of  
lactobionic acid as a product of lactose  
metabolism by *Halobacterium saccharovorum*  
A78-53619
- HORDINSKY, J. R.  
Medical and psychological selection and training  
criteria for European SL-payload specialists  
[AAS PAPER 78-028]  
A78-53608
- HOROWITZ, J. M.  
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adipose tissue thermogenesis  
A78-52698
- HORVATH, P.  
Design of a system of man-computer communication  
A78-51640
- HORVATH, S. M.  
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standing positions  
A78-52541
- HOWITT, J. S.  
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A78-52640
- HUANG, J. T.  
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muscle - Role of carotid chemoreceptors  
A78-52542
- HULTMAN, E.  
Intracellular pH and bicarbonate concentration in  
human muscle during recovery from exercise  
A78-52545
- HUNTER-DUVAR, I. M.  
A scanning study of acoustic-lesions of the cochlea  
A78-53397
- HUNTER, E. D.  
G-seat component development  
[AD-A055533]  
N78-33740
- HURST, M. W.  
Objective job difficulty, behavioural response,  
and sector characteristics in air route traffic  
control centres  
A78-51348
- HUSHON, J.  
Air pollution assessment of vinylidene chloride  
[PB-280624/8]  
N78-32714
- IAKOVLEV, N. N.  
Metabolic structure of the recovery process  
following various physical stresses  
A78-53791
- IGNATOV, I. V.  
Methods of irradiating biological objects and  
results of dosimetry onboard the Kosmos-690  
satellite  
N78-32680
- IHLE, G. H.  
Electrical and biological effects of transmission  
lines: A review  
[BPA-BIO-77-1]  
N78-33722
- IKENO, J.  
The effect of sound duration on annoyance  
A78-51841
- ILIN, G.  
Development of modern spacesuits  
N78-33034
- IMANKULOV, D. I.  
Physical fitness of permanent lowland and highland  
residents  
N78-32679
- INNITZER, J.  
Functional evidence of efferent nerve endings in  
the human inner ear  
A78-53393
- IRISH, P. A., III  
Effects of platform motion, visual and G-seat  
factors upon experienced pilot performance, in  
the flight simulator  
[AD-A055691]  
N78-33739
- ISAEV, G. G.  
Criteria for quantitative evaluation of  
respiratory system responses  
A78-53790
- IVANENKO, L. S.  
Changes in electroencephalograms and autonomic  
reactions of rats to accelerations  
N78-32684
- IVANOV, I. I.  
Effects of weightlessness and hypokinesia on  
contractility of bundles of glycerin-treat rat  
muscle fibers  
N78-32689
- IVANOV, V.  
Development of modern spacesuits  
N78-33034



## J

- JENNINGS, A. E.  
The effects of altitude and two  
decongestant-antihistamine preparations on  
physiological functions and performance  
[AD-A054793] N78-32706
- JOAS, J. G.  
Accurately reproducing pilot's control forces in a  
flight simulator  
[AIAA 78-1585] A78-50663
- JOHANNSEN, G.  
Contributions regarding work load measurement and  
learning behavior in simulated STOL approaches  
A78-52499
- JOHNSON, J. E.  
Micro-fluid exchange coupling apparatus  
[NASA-CASE-ARC-11114-1] N78-33717
- JOHNSON, P. C.  
Evaporative water loss in man in a gravity-free  
environment  
A78-52543
- JOHNSTON, J. D.  
Pneumatic inflatable end effector  
[NASA-CASE-MFS-23696-1] N78-32724
- JOSEPHSON, J. T.  
Manned maneuvering unit - A space platform support  
system  
[AIAA PAPER 78-1663] A78-51990
- JUNKER, A. H.  
A model for the pilot's use of motion cues in  
steady-state roll-axis tracking tasks  
[AIAA 78-1593] A78-50668
- JUSTESEN, D. E.  
Compilation and assessment of microwave  
bioeffects, AO-02-01/EA81028: A selective  
review of the literature on biological effects  
of microwaves in relation to the satellite power  
system  
[PNL-2634] N78-33720

## K

- KAKURIN, L. I.  
Kaliuretic renal function in man as related to  
different degrees of exercise during bedrest  
N78-32675
- KALININA, M. K.  
A microcinematographic method of studying the rate  
of circulation in the brain capillaries  
A78-52400
- KAMIN, A.  
Biological experiments on board Salyut-6  
N78-34032
- KANTOR, S. L.  
Investigation of possibility of using lower body  
negative pressure test for screening cosmonaut  
candidates  
N78-32674
- KAO, H. S. R.  
Unimanual and bimanual control in a compensatory  
tracking task  
A78-51347
- KAPELKO, V. I.  
Effect of hypokinesia on the contractile function  
and neural regulation of the heart  
A78-53789
- KAPLANSKIY, A. S.  
Development of radiation lesions to the rat heart  
during a space flight (experimental  
morphological study)  
N78-32690
- KARELINA, L. N.  
Psychophysiological distinctions of pilot  
performance during brief exposure to intensive  
photic stimuli  
N78-32678
- KARMANOVA, I. G.  
Role of the paradoxical phase in the organization  
of the sleep-wakefulness cycle in the rat  
A78-53786
- KARSANOV, N. V.  
Effects of weightlessness and hypokinesia on  
contractility of bundles of glycerin-treat rat  
muscle fibers  
N78-32689

- KARVINEN, E.  
Lipid metabolism during exercise. I -  
Physiological and biochemical characterization  
of normal healthy male subjects in relation to  
their physical fitness  
A78-51300
- KATOV, Y. A.  
Methods of irradiating biological objects and  
results of dosimetry onboard the Kosmos-690  
satellite  
N78-32680
- KATZ, A.  
Acrylonitrile  
[PB-280478/9] N78-32713
- KERESZTESY, J.  
Acrylonitrile  
[PB-280478/9] N78-32713
- KERE, D. H.  
Effects of nitrogen dioxide on pulmonary function  
in human subjects  
[PB-281186/7] N78-33723
- KHAUSTOVA, N. D.  
On the possible role of lysosomal proteinases in  
the biological effects of accelerations  
N78-32685
- KHONUTETSKAIA, O. E.  
Role of the paradoxical phase in the organization  
of the sleep-wakefulness cycle in the rat  
A78-53786
- KHOROBYKH, A.  
Fifty minute in hydraulic weightlessness  
N78-33018
- KIMBALL, K. A.  
Visual performance/workload of helicopter pilots  
during instrument flight  
[AD-A055424] N78-33738
- KIRCOS, L. T.  
Quantitative organ visualization  
N78-33708
- KIRSCHNER, L. E.  
Response of terrestrial microorganisms to a  
simulated Martian environment  
A78-53624
- KITANOSONO, T.  
Reviews on research and development with respect  
to the life support equipments in JASDP and its  
perspectives  
A78-51499
- KLEIN, K. E.  
Medical and psychological selection and training  
criteria for European SL-payload specialists  
[AAS PAPER 78-028] A78-53608
- KLEINMAN, D.  
Closed loop models for analyzing the effects of  
simulator characteristics  
[AIAA 78-1592] A78-50667
- KLEINWAKS, J. H.  
Development of the Advanced G Cuing System  
[AIAA 78-1572] A78-50653
- KLINOVSKAYA, L. D.  
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reactions of rats to accelerations  
N78-32684
- KLIUEVA, N. Z.  
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respiratory system responses  
A78-53790
- KOBAYASHI, Y.  
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A78-52544
- KOCH, R. A.  
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coronary blood flow ratio in rats exposed to  
intermittent high altitude hypoxia and swimming  
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- KOLODIN, A. V.  
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results of dosimetry onboard the Kosmos-690  
satellite  
N78-32680
- KORNREICH, M.  
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[PB-280624/8] N78-32714

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N78-32683
- KORTELA, I. H.  
A facilitation effect in orientation discrimination  
A78-51957
- KOSUT, R. L.  
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A78-50656
- KOVALEV, O. A.  
Regional redistribution of blood during the immediate aftereffect period following exposure of rats to transverse accelerations  
N78-32693
- KOVALZON, V. H.  
REM deprivation by stimulation of the reticular formation in the rat  
A78-53787
- KRASNOVA, A. P.  
Metabolic structure of the recovery process following various physical stresses  
A78-53791
- KRICHEVSKAYA, A. A.  
Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism  
N78-32687
- KRING, G.  
Spacelab life support and habitability systems growth for extended mission durations [AIAA PAPER 78-1672]  
A78-51997
- KRON, G. J.  
Development of the Advanced G Cuing System [AIAA 78-1572]  
A78-50653
- KRUGLIKOV, R. I.  
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A78-51318
- KRUPINA, T. N.  
Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates  
N78-32674
- KUHL, K.-D.  
The importance of the perilymphatic oxygen supply in the cochlea function  
A78-53395
- KULIKOWSKI, J. J.  
Complete adaptation to patterned stimuli - A necessary and sufficient condition for Weber's law for contrast  
A78-51956
- KUZIN, R. A.  
Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite  
N78-32680
- KWARECKI, K.  
Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887
- LANGSTON, A.  
Binocular detection by normal and stereoblind observers  
A78-53082
- LAPAIEV, E. V.  
A procedure for the automated analysis of vestibular nystagmus  
A78-50750
- LARIONOV, N. P.  
Effect of hypokinesia on the contractile function and neural regulation of the heart  
A78-53789
- LARUSSA, J.  
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A78-50666
- LATEGOLA, M. T.  
Three reports relevant to stress in aviation personnel [AD-A051690]  
N78-32699
- Cardiorespiratory assessment of decongestant-antihistamine effects on altitude, +Gz, and fatigue tolerances [AD-A055089]  
N78-32707
- LEACH, C. S.  
Evaporative water loss in man in a gravity-free environment  
A78-52543
- LEATHERWOOD, J. D.  
Effect of vibration duration on human discomfort [NASA-TP-1283]  
N78-32717
- LECHNER, A. J.  
The scaling of maximal oxygen consumption and pulmonary dimensions in small mammals  
A78-53710
- LECROISSETTE, D. H.  
Tissue identification by ultrasound [NASA-CR-157776]  
N78-33716
- LEE, J. M., JR.  
Electrical and biological effects of transmission lines: A review [BPA-BIO-77-1]  
N78-33722
- LEES, R. A.  
Visual performance/workload of helicopter pilots during instrument flight [AD-A055424]  
N78-33738
- LEFRANCOIS, R.  
Pulmonary gas exchange, diffusing capacity in natives and newcomers at high altitude  
A78-53711
- LEMASTER, W. D.  
Area of interest/field-of-view research using ASPT [AD-A055692]  
N78-32718
- LENDA, J. A.  
Manned maneuvering unit - A space platform support system [AIAA PAPER 78-1663]  
A78-51990
- LENKOVA, R. I.  
Metabolic structure of the recovery process following various physical stresses  
A78-53791
- LEONARD, J. I.  
Evaporative water loss in man in a gravity-free environment  
A78-52543
- LEIVISON, W. H.  
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A78-50668
- LEVKOVICH, I. I.  
A microcinematographic method of studying the rate of circulation in the brain capillaries  
A78-52400
- LEWIS, M. A.  
Objective assessment of prior air traffic control-related experience through the use of an occupational knowledge test  
A78-52636
- LIM, D. J.  
Fine morphology of the tectorial membrane - Fresh and developmental  
A78-53392
- LISOVSKAYA, S. A.  
Protective effects of 2-aminobenzimidazole during hyperbaric oxygenation, and state of cerebral nitrogen metabolism  
N78-32687
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Area of interest/field-of-view research using ASPT [AD-A055692]  
N78-32718
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The importance of the perilymphatic oxygen supply in the cochlea function  
A78-53395
- LOZINSKII, V. S.  
Autogenic training in a practical course of summer instruction of student pilots  
A78-52275
- LUND, G. P.  
A subcutaneous channeling probe for implanting long leads  
A78-51872

- LUPP, U.  
How presaccadic gratings modify postsaccadic  
modulation transfer function  
A78-51953
- LUTSENKO, N. M.  
Histochemical study of digestive organs of rats  
involved in space flight on the Kosmos-690  
satellite  
N78-32681
- LYNE, P. J.  
Cardiorespiratory assessment of  
decongestant-antihistamine effects on  
altitude, +Gz, and fatigue tolerances  
[AD-A055089]  
N78-32707

## M

- MACAGNO, E. R.  
Mechanism for the formation of synaptic  
projections in the arthropod visual system  
A78-52372
- MACELROY, R. D.  
Computer display and manipulation of biological  
molecules  
A78-53400
- MACHINO, M.  
Some findings on the inner ear after experimental  
obliteration of the endolymphatic duct and sac  
of guinea pigs  
A78-53396
- MADDOCK, J. T.  
Acrylonitrile  
[PB-280478/9]  
N78-32713
- MAGEDOV, V. S.  
Dynamics of afferent impulsion in posterior  
spinal radices of dogs with restricted movement  
N78-32696
- MAILIAN, E. S.  
Respiratory activity of mitochondria in corn-root  
cells, grown under conditions of variable gravity  
A78-51394
- MAKSINOV, D. G.  
Evaluation of regional blood filling by means of  
rheoplethysmography combined with functional tests  
N78-32676
- MAKSINOV, N. A.  
Significance of glycolysis in tissues for the  
combined action of hypercapnia, hypoxia, and  
hypothermia  
A78-51662
- MAKSINUK, V. P.  
Role of the paradoxical phase in the organization  
of the sleep-wakefulness cycle in the rat  
A78-53786
- MALSEED, R. T.  
Acrylonitrile  
[PB-280478/9]  
N78-32713
- MANDELL, A.  
Condition sensor system and method  
[NASA-CASE-MSC-14805-1]  
N78-32720
- MANOVTSSEV, G. A.  
Effect of the combination of dry air heat and cold  
water treatment on human orthostatic stability  
N78-32695
- MASLENNIKOVA, L. S.  
Some indices of oxygen exchange and resistance of  
rats to acute hypoxia during posttransfusion  
polycythemia  
A78-53788
- MATEEV, S.  
Saccadic eye movements and localization of visual  
stimuli  
A78-53083
- MATHEW, J. E. W.  
Texture discrimination and Fourier analysis in  
human vision  
A78-53865
- MCCARTHY, V. O.  
The relationship between comfortable loudness  
range and most comfortable loudness for pure  
tones and speech in sensorineural hearing loss  
N78-32698
- MCCRACKEN, T. M.  
Gas elimination during a single-stage decompression  
A78-52637
- MCPADDEN, B. W.  
Accurately reproducing pilot's control forces in a  
flight simulator  
[AIAA 78-1585]  
A78-50663

- MCGUIRE, D. C.  
Emulation of an advanced G-seat on the advanced  
simulator for pilot training  
[AD-A055532]  
N78-33741
- MEKENZIE, J. M.  
The effects of altitude and two  
decongestant-antihistamine preparations on  
physiological functions and performance  
[AD-A054793]  
N78-32706
- MEKISSICK, B. T.  
Experimental attempts to evoke a differential  
response to different stressors  
[AD-A054795]  
N78-32716
- MCKISSICK, B. T.  
The effect of helmet loader G-cueing on pilot's  
simulator performance  
[AIAA 78-1573]  
A78-50654
- MCHITT, R. E.  
Regions of differential cell elongation and  
mitosis, and root meristem morphology in  
different tissues of geotropically stimulated  
maize root apices  
A78-52631
- MEERSON, P. Z.  
Effect of hypokinesia on the contractile function  
and neural regulation of the heart  
A78-53789
- MEGALDADZE, V. A.  
Effects of weightlessness and hypokinesia on  
contractility of bundles of glycerin-treat rat  
muscle fibers  
N78-32689
- MELACCI, P. T.  
Real-time compression of ECG data - Technical  
realization  
A78-51459
- MELTON, C. E.  
Three reports relevant to stress in aviation  
personnel  
[AD-A051690]  
N78-32699
- MESELMAN, A. S.  
Experimental attempts to evoke a differential  
response to different stressors  
[AD-A054795]  
N78-32716
- MENDZHERITSKAYA, L. G.  
Protective effects of 2-aminobenzimidazole during  
hyperbaric oxygenation, and state of cerebral  
nitrogen metabolism  
N78-32687
- MIASNIKOV, V. I.  
Effect of vitamin and amino acid supplements on  
human performance during heavy mental and  
physical work  
A78-52638
- MIKHALEVA, N. P.  
Effects of weightlessness and hypokinesia on  
contractility of bundles of glycerin-treat rat  
muscle fibers  
N78-32689
- MIKHALEVA, N. P.  
Electrolyte content of the myocardium, skeletal  
muscles and blood of rats during prolonged  
hypokinesia and readaption  
N78-32692
- MILLER, J.  
Binocular interactions during establishment of  
McCollough effects  
A78-51955
- MIROSHNIKOVA, Y. B.  
Dynamics of free amino acid levels in human blood  
plasma during bed rest in head down position  
N78-32677
- MIZUMOTO, K.  
Visual problems of pilots - Study on distance  
judgement of pilots  
A78-51500
- MOGILNAYA, G. M.  
Histochemical study of digestive organs of rats  
involved in space flight on the Kosmos-690  
satellite  
N78-32681
- MOHLER, S. R.  
U.S. fatal general aviation accidents due to  
cardiovascular incapacitation: 1974-75  
A78-52644
- MONTUORI, A.  
Relationship between osmotic pressure of the blood  
and secretion of sweat  
[NASA-TN-75461]  
N78-33703

- MOORE-EDDE, M. C.  
Circadian rhythm dissociation in an environment  
with conflicting temporal information A78-52699
- MOORE, R. K.  
Contrast sensitivity during saccadic eye movements A78-51954
- MOOREY, E. R.  
Inhibition of bone formation during space flight A78-51225
- MORGAN, J. E.  
Condition sensor system and method  
[NASA-CASE-NSC-14805-1] N78-32720
- MORGAN, M. J.  
Smooth eye tracking and the perception of motion  
in the absence of real movement A78-51951
- MUCHNIK, C.  
A rheological model for research on cochlear hypoxia A78-53394
- MUELLER, W. H.  
Multinational Andean Genetic and Health Program.  
VII - Lung function and physical growth -  
Multivariate analyses in high- and low-altitude  
populations A78-52639
- MUKROWSKY, W.  
Spacelab life support and habitability systems  
growth for extended mission durations  
[AIAA PAPER 78-1672] A78-51997
- MULLEN, S. R.  
The effects of altitude and two  
decongestant-antihistamine preparations on  
physiological functions and performance  
[AD-A054793] N78-32706
- MULLIN, J. P.  
Oxygen consumption during constant-load exercise A78-52540
- MURALIDHARAN, R.  
Closed loop models for analyzing the effects of  
simulator characteristics  
[AIAA 78-1592] A78-50667
- N**
- NABELEK, I. V.  
An audiometric and histologic comparison of noise-  
and drug-induced cochlear pathology in the  
chinchilla A78-53398
- NAGLE, P. J.  
Oxygen consumption during constant-load exercise A78-52540
- NAGOURNEY, B. A.  
Mental rotation under head tilt - Factors  
influencing the location of the subjective  
reference frame A78-53084
- NAKAYAMA, K.  
Egocentric orientation is influenced by trained  
voluntary cyclorotary eye movements A78-51856
- Impedance cardiography for estimating cardiac  
output during submaximal and maximal work A78-52544
- NEDEVETSKIY, V. A.  
Biomedical effects of millimeter radio waves N78-33729
- NEGULESCO, J. A.  
Effects of fracture trauma, estrone treatment, and  
a 2-G environment on the epiphyseal cartilage  
zones of developing avian radii A78-52643
- NEPOCHATOV, O. N.  
Regional redistribution of blood during the  
immediate aftereffect period following exposure  
of rats to transverse accelerations N78-32693
- NEUBAUER, J. A.  
Blood flow and relative tissue PO<sub>2</sub> of brain and  
muscle - Role of carotid chemoreceptors A78-52542
- NORGAN, N. G.  
Effect of altitude on dietary-induced  
thermogenesis at rest and during light exercise  
in man A78-52537

- NOSOVA, Y. A.  
Effects of weightlessness and hypokinesia on  
contractility of bundles of glycerin-treat rat  
muscle fibers N78-32689
- NUSSINOV, M. D.  
Formation of early earth regolith A78-50277
- NYBORG, W. L.  
Physical mechanisms for biological effects of  
ultrasound  
[PB-282234/4] N78-33725
- O**
- OGANOV, V. S.  
Dynamics of afferent impulsation in posterior  
spinal radices of dogs with restricted movement N78-32696
- OKAMOTO, M.  
Impedance cardiography for estimating cardiac  
output during submaximal and maximal work A78-52544
- OMALLEY, H.  
Auditory frequency selectivity and two-tone  
suppression in normal hearing human listeners N78-32697
- ONEILL, J. J., JR.  
Annotated bibliography on biological effects of  
metals in aquatic environments, 3d  
[PB-280953/1] N78-32715
- ONSTOTT, E. D.  
Prediction, evaluation, and specification of  
closed loop and multiaxis flying qualities  
[AD-A056983] N78-33736
- OSHIMA, W.  
Some findings on the inner ear after experimental  
obliteration of the endolymphatic duct and sac  
of guinea pigs A78-53396
- OSHRIN, S. E.  
The effort of noise exposure on the masking level  
difference N78-33709
- OZOLA, B. O.  
Effect of age on mechanical properties and  
biochemical composition of the heart arteries in  
man A78-50531

**P**

- PANG, K. D.  
Photocatalytic oxidation of organic compounds on  
Mars A78-51137
- PANOV, A. H.  
Role of the paradoxical phase in the organization  
of the sleep-wakefulness cycle in the rat A78-53786
- PARFENOV, G. P.  
Present status of the problem concerning the  
detection of gravity by plants A78-50998
- PARRISH, R. V.  
Platform motion for fighter simulations  
[AIAA 78-1574] A78-50655
- PASQUIS, P.  
Pulmonary gas exchange, diffusing capacity in  
natives and newcomers at high altitude A78-53711
- PAUER, D.  
Design of a system of man-computer communication A78-51640
- PAVLOV, I.  
Development of modern spacesuits N78-33034
- PERERVA, I. I.  
A procedure for the automated analysis of  
vestibular nystagmus A78-50750
- PERRY, D. E.  
Electrical and biological effects of transmission  
lines: A review  
[BPA-BIO-77-1] N78-33722
- PETROSELLI, A.  
Real-time compression of ECG data - Technical  
realization A78-51459

- PETROSYAN, E. P.  
Distinctions of radioprotective effect of acute hypoxia on 5-day-old mice preadapted to oxygen deficiency  
N78-32683
- PETROV, Y. P.  
Psychophysiological distinctions of pilot performance during brief exposure to intensive photic stimuli  
N78-32678
- PETRY, H. M.  
Binocular interactions during establishment of McCollough effects  
A78-51955
- PFENDLER, C.  
Contributions regarding work load measurement and learning behavior in simulated STOL approaches  
A78-52499
- PHOCAS, E.  
The effect of seawater on thermoregulator centers [NASA-TN-75443]  
N78-32669
- PICARDI, G.  
Real-time compression of ECG data - Technical realization  
A78-51459
- PIERGALLINI, J. R.  
Heat transfer principles in personal protection applications  
A78-51222
- PINSKI, M. S.  
Three-dimensional anthropometry of the adult face [AD-A054938]  
N78-32705
- PIOLINI, M.  
Breathing pattern in men during inspiratory elastic loads  
A78-53712
- PIROGOV, N. I.  
Biomedical effects of millimeter radio waves  
N78-33729
- PLANT, R. E.  
Controlled cellular energy conversion in brown adipose tissue thermogenesis  
A78-52698
- POGODIN, M. A.  
Criteria for quantitative evaluation of respiratory system responses  
A78-53790
- POLHEMUS, J. T.  
Condition sensor system and method [NASA-CASE-MSC-14805-1]  
N78-32720
- PONNAMPERUMA, C. A.  
Life beyond the earth  
N78-32136
- POPOV, V. I.  
Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite  
N78-32680
- PORTMANN, M.  
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A78-53391
- PORTUGALOV, V. V.  
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A78-50997
- PUIG, J. A.  
Motion - Methods and requirements [AIAA 78-1576]  
A78-50657
- PURINIA, B. A.  
Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
A78-50531

## R

- RAGAN, H. A.  
Compilation and assessment of microwave bioeffects, A0-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system [PNL-2634]  
N78-33720

- RAHKILA, P.  
Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness  
A78-51300
- RAKOVA, I. A.  
Morphological study of hemopoietic organs of hypokinetic rats  
N78-32686
- RAKUSA-SUSZCZEWSKI, S.  
Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887
- RANBAUT, P. C.  
Evaporative water loss in man in a gravity-free environment  
A78-52543
- RASHUSSEN, P. G.  
Aeromedical implications of the X-Chrom lens for improving color vision deficiencies [AD-A054794]  
N78-32708
- RAYMAN, E. B.  
Bleeding duodenal ulcer and the flier  
A78-52646
- REDDICK, E. J.  
Movement by helicopter of patients with decompression sickness  
A78-52645
- REIN, R.  
Computer display and manipulation of biological molecules  
A78-53400
- REINIS, S.  
Bleeding into inner ears of chinchillas caused by simulated sonic boom  
A78-51847
- RENUSZKO, S.  
Polish cosmonaut selection process described  
N78-33033
- REYNOLDS, R. V.  
Depth perception and motion cues via textured scenes [AIAA 78-1577]  
A78-50658
- RICARD, G. L.  
Motion - Methods and requirements [AIAA 78-1576]  
A78-50657
- Time delays in flight simulators - Behavioral and engineering analyses [AIAA 78-1596]  
A78-50670
- RIGGS, L. A.  
Contrast sensitivity during saccadic eye movements  
A78-51954
- Binocular interactions during establishment of McCollough effects  
A78-51955
- RODARTE, J. R.  
Regional lung expansion at total lung capacity in intact vs. excised canine lungs  
A78-52539
- ROGERS, L. E.  
Compilation and assessment of microwave bioeffects, A0-02-01/EA81028: A selective review of the literature on biological effects of microwaves in relation to the satellite power system [PNL-2634]  
N78-33720
- ROSE, R. M.  
Objective job difficulty, behavioural response, and sector characteristics in air route traffic control centres  
A78-51348
- ROSEMEYER, B.  
The lumbosacral segment as a vulnerable region in various postures [NASA-TN-75579]  
N78-33713
- ROSENGARTEN, S. J.  
A unique approach to aerial refueling simulation for training boom operators [AIAA 78-1591]  
A78-50666
- ROSLIAKOV, V. A.  
GOI anomaloscopes used to set standards for color vision of flight personnel  
N78-32688

- ROTHHAMMER, P.  
Multinational Andean Genetic and Health Program.  
VII - Lung function and physical growth -  
Multivariate analyses in high- and low-altitude  
populations A78-52639
- ROZOV, A. N.  
Respiratory activity of mitochondria in corn-root  
cells, grown under conditions of variable gravity  
A78-51394  
Effects of altered gravity on viscosity of  
cytoplasm and protein content of plant cells  
N78-32691
- ROZOVA, E. I.  
Some indices of oxygen exchange and resistance of  
rats to acute hypoxia during posttransfusion  
polycythemia A78-53788
- RUBINSKAIA, N. L.  
Role of the paradoxical phase in the organization  
of the sleep-wakefulness cycle in the rat  
A78-53786
- RUBINSTEIN, M.  
A rheological model for research on cochlear hypoxia  
A78-53394
- RUMIANTSEV, G. V.  
The role of a decrease in body heat content in the  
thermoregulatory response of ear passageways  
A78-51661
- RUMIANTSEVA, M. P.  
Effect of vitamin and amino acid supplements on  
human performance during heavy mental and  
physical work A78-52638

## S

- SAHLIN, K.  
Intracellular pH and bicarbonate concentration in  
human muscle during recovery from exercise  
A78-52545
- SAHETOV, E.  
A rheological model for research on cochlear hypoxia  
A78-53394
- SALDIVAR, J. T.  
Experimental attempts to evoke a differential  
response to different stressors  
[AD-A054795] N78-32716
- SAMEJIMO, F.  
Estimation of the operating characteristics of  
item response categories 4: Comparison of the  
different methods  
[AD-A057161] N78-33735
- SARKINEN, S. M.  
Electrical and biological effects of transmission  
lines: A review  
[BPA-BIO-77-1] N78-33722
- SCHNEIDER, A. J.  
A unique approach to aerial refueling simulation  
for training boom operators  
[AIAA 78-1591] A78-50666
- SCHRAMM, E.  
The effect of various drugs on experimentally  
induced ulcers in immobilized rats  
[NASA-TM-75340] N78-32670
- SCHULL, W. J.  
Multinational Andean Genetic and Health Program.  
VII - Lung function and physical growth -  
Multivariate analyses in high- and low-altitude  
populations A78-52639
- SELIVERSTOV, L. N.  
Methods of irradiating biological objects and  
results of dosimetry onboard the Kosmos-690  
satellite N78-32680
- SEMEV, V. G.  
Methods of irradiating biological objects and  
results of dosimetry onboard the Kosmos-690  
satellite N78-32680
- SERGEEV, A. I.  
Effect of impulse accelerations on the condition  
of the cardiovascular system of healthy people  
A78-52274
- SHAFIRKIN, A. P.  
Investigation of the influence of prolonged  
rotation on radiation lesions N78-32682
- SHANAHAN, A. J.  
Formation and management of an expert  
toxicological review team for literature search,  
evaluation and organization of currently  
available rapid toxicological tests, volume 1  
[AD-A056311] N78-33718  
Formation and management of an expert  
toxicological review team for literature search,  
evaluation and organization of currently  
available rapid toxicological tests, volume 2  
[AD-A056312] N78-33719
- SHAUGHNESSY, J. D.  
Adaptation of time line analysis program to single  
pilot instrument flight research  
[NASA-TM-78748] N78-33731
- SHCHEGOLKOV, A. M.  
Effect of hypokinesia on the contractile function  
and neural regulation of the heart A78-53789
- SHCHERBA, M. M.  
Some indices of oxygen exchange and resistance of  
rats to acute hypoxia during posttransfusion  
polycythemia A78-53788
- SHEIPAK, L. M.  
Effect of impulse accelerations on the condition  
of the cardiovascular system of healthy people  
A78-52274
- SHEN-MILLER, J.  
Regions of differential cell elongation and  
mitosis, and root meristem morphology in  
different tissues of geotropically stimulated  
maize root apices A78-52631
- SHEREMETEVSKAYA, S. K.  
Regional redistribution of blood during the  
immediate aftereffect period following exposure  
of rats to transverse accelerations N78-32693
- SHERGOLD, G. R.  
Workload and fatigue-in-flight EEG changes  
A78-52640
- SHESTKOV, B. P.  
Effect of vitamin and amino acid supplements on  
human performance during heavy mental and  
physical work A78-52638
- SHETZER, L. I.  
Mental rotation under head tilt - Factors  
influencing the location of the subjective  
reference frame A78-53084
- SHEVELEV, I. A.  
Interrelationship of the properties of visual  
neurons A78-51319
- SHIDA, S.  
Some findings on the inner ear after experimental  
obliteration of the endolymphatic duct and sac  
of guinea pigs A78-53396
- SHIH, K. L.  
Degradation of biochemical activity in soil  
sterilized by dry heat and gamma radiation  
A78-53874
- SHIRVINSKAYA, M. A.  
Dynamics of afferent impulsation in posterior  
spinal radices of dogs with restricted movement  
N78-32696
- SHNELEVA, A. M.  
Criteria for quantitative evaluation of  
respiratory system responses A78-53790
- SHONKA, J. J.  
Fast neutron depth dose distributions in a  
heterogeneous phantom N78-33712
- SHONYO, C.  
Anthropometry: Basic studies and applications,  
volume 2. A bibliography with abstracts  
[NTIS/PS-78/0866/0] N78-33726
- SHUBICH, M. G.  
Histochemical study of digestive organs of rats  
involved in space flight on the Kosmos-690  
satellite N78-32681

- SHVETS, V. N.  
Morphological study of hemopoietic organs of hypokinetic rats  
N78-32686
- SIMMONDS, R. C.  
A subcutaneous channeling probe for implanting long leads  
A78-51872
- SIMMONS, R. B.  
Visual performance/workload of helicopter pilots during instrument flight  
[AD-A055424]  
N78-33738
- SIMON, C. W.  
Design, analysis, and interpretation of screening studies for human factors engineering research, revision  
[AD-A056985]  
N78-33743
- SKURATOVA, S. A.  
Dynamics of afferent impulsation in posterior spinal radicles of dogs with restricted movement  
N78-32696
- SLEPCHUK, W. A.  
The role of a decrease in body heat content in the thermoregulatory response of ear passageways  
A78-51661
- SLUTSKII, L. I.  
Effect of age on mechanical properties and biochemical composition of the heart arteries in man  
A78-50531
- SMITH, K. U.  
Unimanual and bimanual control in a compensatory tracking task  
A78-51347
- SOINAJARVI, J.  
Lipid metabolism during exercise. I - Physiological and biochemical characterization of normal healthy male subjects in relation to their physical fitness  
A78-51300
- SOROKIN, A. P.  
Quantitative systems analysis of various regimes of intense muscular loading  
A78-51320
- SOUZA, K. A.  
Degradation of biochemical activity in soil sterilized by dry heat and gamma radiation  
A78-53874
- STEFANOTOS, G.  
Mental rotation under head tilt - Factors influencing the location of the subjective reference frame  
A78-53084
- STEINMAN, R. M.  
The effect of luminance on human smooth pursuit of perifoveal and foveal targets  
A78-51952
- STIRLING, J. L.  
Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538
- STOCK, M. J.  
Effect of altitude on dietary-induced thermogenesis at rest and during light exercise in man  
A78-52537
- Effects of exercise, altitude, and food on blood hormone and metabolite levels  
A78-52538
- STOLL, A. M.  
Heat transfer principles in personal protection applications  
A78-51222
- STROHM, M. P.  
The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by *Halobacterium saccharovorum*  
A78-53619
- SUDAKOV, K. V.  
Quantitative systems analysis of various regimes of intense muscular loading  
A78-51320
- SULZMAN, F. M.  
Circadian rhythm dissociation in an environment with conflicting temporal information  
A78-52699
- SUNG, W. P.  
Volume-restricted freezing of living cells and tissues  
[ORNL/MT-265]  
N78-33705
- SUTTY, G. J.  
Depth perception and motion cues via textured scenes  
[AIAA 78-1577]  
A78-50658
- SUZUKI, M.  
Some findings on the inner ear after experimental obliteration of the endolymphatic duct and sac of guinea pigs  
A78-53396
- SVIRIZHEV, Y. M.  
Investigation of possibility of using lower body negative pressure test for screening cosmonaut candidates  
N78-32674
- SWARTZ, P. F.  
Micro-fluid exchange coupling apparatus  
[NASA-CASE-ARC-11114-1]  
N78-33717
- SYCHKOV, M. A.  
Methods of irradiating biological objects and results of dosimetry onboard the Kosmos-690 satellite  
N78-32680

## T

- TABAKOVA, L. A.  
Investigation of the influence of prolonged rotation on radiation lesions  
N78-32682
- TABOADA, J.  
Retinal tissue damage induced by single ultrashort 1060 nm laser light pulses  
A78-51078
- TAIRBEKOV, M. G.  
Present status of the problem concerning the detection of gravity by plants  
A78-50998
- Respiratory activity of mitochondria in corn-root cells, grown under conditions of variable gravity  
A78-51394
- Effects of altered gravity on viscosity of cytoplasm and protein content of plant cells  
N78-32691
- TAKADA, K.  
Impedance cardiography for estimating cardiac output during submaximal and maximal work  
A78-52544
- TAKAGI, K.  
The effect of sound duration on annoyance  
A78-51841
- TAKEUCHI, T.  
Impedance cardiography for estimating cardiac output during submaximal and maximal work  
A78-52544
- TAYLOR, T. J.  
Acrylonitrile  
[PB-280478/9]  
N78-32713
- TERELAK, J.  
Sensory deprivation and social isolation as problems of space psychology - Interpretation of Antarctic and laboratory data  
A78-51887
- THACKRAY, R. I.  
Comparison of the vigilance performance of men and women using a simulated radar task  
A78-52642
- THOMAS, R. B.  
Research and development of a luminol-carbon monoxide flow system  
[NASA-CR-156832]  
N78-32671
- Biological water quality monitoring using chemiluminescent and bioluminescent techniques  
[NASA-CR-156830]  
N78-33702
- THOMPSON, G. W.  
Annotated bibliography on biological effects of metals in aquatic environments, 3d  
[PB-280953/1]  
N78-32715
- TONLINSON, G. A.  
The metabolism of carbohydrates by extremely halophilic bacteria - The identification of lactobionic acid as a product of lactose metabolism by *Halobacterium saccharovorum*  
A78-53619

- POTSKIY, V. M.**  
On the possible role of lysosomal proteinases in the biological effects of accelerations  
N78-32685
- TOUCHSTONE, R. M.**  
Comparison of the vigilance performance of men and women using a simulated radar task  
A78-52642
- TROSHIKHIN, G. V.**  
Some indices of oxygen exchange and resistance of rats to acute hypoxia during posttransfusion polycythemia  
A78-53788
- TROUT, E. M.**  
Evaluation of seating and restraint systems and anthropomorphic dummies conducted during fiscal year 1977  
[AD-A056905]  
N78-33737
- TSIBULSKII, V. L.**  
REM deprivation by stimulation of the reticular formation in the rat  
A78-53787
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Physical fitness of permanent lowland and highland residents  
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Smooth eye tracking and the perception of motion in the absence of real movement  
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Advances in human internal radiation counting at Los Alamos: Multiple simultaneous in-vivo measurements  
[LA-UR-78-1063]  
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- UYTENHOVE, H. J. J.**  
Computer implemented grading of flight simulator students  
[AIAA 78-1589]  
A78-50665

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Visual stimulator  
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- VARGAS, E.**  
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- VASILYEVA, T. D.**  
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[NASA-CASE-ARC-11059-1]  
N78-32721

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[AIAA 78-1586]  
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Motion - Methods and requirements  
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Blood flow and relative tissue PO<sub>2</sub> of brain and muscle - Role of carotid chemoreceptors  
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A subcutaneous channeling probe for implanting  
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Shuttle/Spacelab  
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maize root apices  
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modulation transfer function  
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[AD-A056940]  
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The effect of sound duration on annoyance  
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- YAMANE, S.  
Studies on the light and dark adaptation system in  
the retina  
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- YARMONENKO, S. P.  
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hypoxia on 5-day-old mice preadapted to oxygen  
deficiency  
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negative pressure test for screening cosmonaut  
candidates  
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during exposure to ionizing radiation  
[NASA-TM-75106]  
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muscles and blood of rats during prolonged  
hypokinesia and readaption  
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Multivariate analyses in high- and low-altitude  
populations  
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[AD-A054938]  
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results of dosimetry onboard the Kosmos-690  
satellite  
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vestibular nystagmus  
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as an index of skin blood flow  
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- ZHERNAVKOV, V. F.  
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performance during brief exposure to intensive  
photic stimuli  
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with the level of energy consumption in man  
during adaptation to heat  
[NASA-TM-75331]  
N78-32704
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water treatment on human orthostatic stability  
N78-32695
- ZHURAVLEV, V. A.  
The combined effect of an SHF field and an  
unfavorable microclimate on the body  
N78-33730

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